Search Strategy

We searched for relevant research articles published between January 1990 to June 2018 in the following data sources: MEDLINE via PUBMED, EMBASE, and the COCHRANE library using the following search terms: (Bifidobacter$ OR Lactobacil$ OR Lactococcus OR Leuconostoc OR Oenococcus OR Pediococcus OR Propionibacter$ OR Streptococcus OR probiotics OR “fermented milk”) AND (“trial” OR "controlled study" OR “clinical study” OR “blinded study” OR randomised OR randomized OR crossover NOT cohort) AND (“obes$ OR diabet$ OR weight OR “metabolic syndrome” OR "glucose intolerant" OR "glucose tolerant" OR "glucose tolerance" OR "glucose intolerance" OR "insulin resistance" OR "insulin sensitivity” OR "impaired fasting glucose" OR "waist circumference" "OR "abdominal adiposity" OR " abdominal obesity" OR "central obesity" OR "visceral adipose tissue" OR "visceral fat" OR "visceral adiposity" OR fat OR "fatty liver" OR "non-alcoholic fatty liver") NOT (hypercholesterolemic OR hypercholesterolemia) NOT [(child OR children OR infants) AND (age < 3 years)] NOT (neonates OR new-borns OR newborns) NOT rabbits NOT mouse NOT rats NOT pigeons NOT salmon NOT piglet NOT pig NOT beef NOT cattle NOT donkeys NOT sheep NOT chickens NOT hamsters NOT bass NOT fish NOT dogs NOT cats. Articles only published in English, French, German, Spanish or Portuguese language were considered. Then the reference list of the identified papers was searched.

Data extraction

In Ekhlasi et al[1], we did not extract BW and HOMA-IR since changes in these parameters were not coherent with changes in BMI, INS and FG. We considered the study population type 2 diabetes with > 70% of subjects on prescribed drugs for diabetes.[2] In patients with diabetic foot ulcer we did not extract CRP assuming the level does not reflect the low grade inflammation[3]. We clustered strains at the species level with two exceptions: 1) when all the strains were belonging to the same subspecies (i.e. *Streptococcus* subsp. *thermophilus,* and *Bifidobacterium animalis* subsp. *lactis*) and 2) when clustering *Lactobacillus casei* and *Lactobacillus paracasei* species. Concerning the last two species, their classification was controversial and we clustered them as *L. casei* group. For the mix of strains VSL#3, the former *Bifidobacterium longum* subsp. *infantis* and *Bifidobacterium longum* subsp. *longum* were reclassified both as *B. lactis* and *L. delbrueckii* subsp. *bulgaricus* was reclassified as *Lactobacillus helveticus*[4]. When correctly classified, *L. sporogenes* is a *Bacillus coagulans* and therefore, sensitivity analysis excluding this strain was performed. We presented species according to the phylogenetic tree based on the 16S gene sequences.[5 6]

The review team contacted the author of the original publication, the sourcing company or resolved uncertainty by a consensus. When it is not clearly specified (ex: each probiotic capsule contained 5 billion of 5 bacterial strains), we assumed that the amount is related to the total amount of bacteria and not for each strain. For Akbari et al[7], according to the capsule used in Kouchaki et al[8], and Mohseni et al[3], knowing that the mix of strains, the count and the company providing the mix were identical, that the milk was not qualified as fermented milk, and according to references given in the article, we assumed that a capsule was poured in the milk. We assumed that 2.10^9CFU/g was related to the capsule and not to the milk. Asgharian et al[9], the product Familact is clearly described in Karbaschian et al[10] and we considered the amount of bacteria described in this publication. For Firouzi et al[11], the bacteria amount given was not coherent: “Each sachet provided a 3×10^{10} dose of six viable microbial cell preparation strains… The daily dose of each strain was 10^{10} CFUs”. We considered the amount given in the publication of Firouzi et al[12], i.e. 6.10^{10} CFU. For Karbaschian et al[10], the weight of the Familact’s capsule is given on the website of the company (http://zisttakhmir.com/product/Familact/lang/2) and in Asgharian et al[9] 500mg. For Madj et al[13], the amount of probiotic was low for a fermented milk, 10^7 in 200ml which was equivalent to 4.10^4 CFU/mL. However, the 10^7 CFU/ml seems coherent with amount normally used for probiotic effect and we considered this amount. In cases of multiple interventions at different doses of probiotics, the highest dose was compared with the control[14 15]. In Sadrzadeh et al[16], the amount of *L. acidophilus* LA5 and *B. lactis* BB12 was 3.9×10^7 CFU/g. According to the amount of *S. thermophilus* and *L. bulgaricus* of 10^6-10^7 CFU in this paper, we assumed that the amounts of bacteria were given in CFU/g.

References

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Supplementary Tables

Supplementary Table 1: Characteristics of included randomized controlled trials of probiotics: anthropometric variables and BMI.

Study	Population	Country	Probiotics	Daily dose (cfu)	Trial length (week)	n		Mean age		Gender		Mean BW (kg)		Mean BMI (kg/m²)		Mean WC (cm)		Mean BFM (kg)	
						INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Agerholm-Larsen (2000)	OW, OB	Denmark	*S. ther., L. acid.*	5,4E+10	8	16	14	38,6	39,4	12/4	9/5	85,9	87,9	30,0	30,0	-	-	32,2	32,6
Agerholm-Larsen (2000)	OW, OB	Denmark	*S. ther., L. rham.*	4,5E+11	8	14	14	37,9	28,7	10/4	9/5	90,5	87,9	30,2	30,0	-	-	33,6	32,6
Ahmadi (2016)	GDM	Iran	*B. bif., L. acid., L. cas. gr.*	6,0E+09	6	35	35	28,5	28,7	0/35	0/35	77,7	74,9	28,7	28,4	-	-	-	-
Ahn (2015)	HTG	South Korea	*L. cur., L. plan.*	1,0E+10	12	46	46	54,1	52,7	15/31	15/31	-	-	24,7	24,9	-	-	-	-
Aihara (2005)	High-normal BP	Japan	*L. hel.*	-	4	20	20	49,9	52,8	13/7	13/7	-	-	24,1	24,3	-	-	-	-
Aihara (2005)	mild HT	Japan	*L. hel.*	-	4	20	20	51,9	51,5	16/4	16/4	-	-	24,9	25,1	-	-	-	-
Akbari (2016)	AD	Iran	*B. bif., L. acid., L. cas. gr. L. fer.*	6,0E+09	12	30	30	82	78	6/24	6/24	59,0	56,6	23,8	22,7	-	-	-	-
Akkasheh (2016)	MDD	Iran	*B. bif., L. acid., L. cas. gr.*	6,0E+09	8	20	20	38,3	36,2	3/17	3/17	72,6	68,0	27,6	26,3	-	-	-	-
Alisi (2014)	OB, NASH children	Italy	*B. brev., B. lac., L. acid. S. ther., L. helv., L. cas. gr., L. plan.*	1,1E+12	17	22	22	11	10	10/12	14/8	-	-	27,1	25,6	-	-	-	-
Aller (2011)	NAFLD	Spain	*S. ther., L. del.*	5,0E+08	13	14	14	49,4	44,3	10/4	10/4	85,3	88,8	30,2	29,5	-	-	40,2	37,7
Andreasen (2010)	T2DM, IGT, NGT	Denmark	*L. acid.*	1,0E+10	4	21	24	55	60	21/0	24/0	-	-	-	-	-	-	-	
Asemi (1) (2014)	T2DM	Iran	*L. spor.*	2.7E+08	6	62	62	35-70	35-70	19/43	19/43	74,9	75,4	29,6	29,9	-	-	-	-
Asemi (2) (2013)	Pregnant	Iran	*B. lac., L. acid.*	-	9	37	33	24,2	25,7	0/37	0/33	-	-	-	-	-	-	-	-
Asemi (3) (2013)	T2DM	Iran	*L. acid., L. rham., L. cas. gr. B. brev., B. lon., S. ther., L. del.*	3,9E+10	8	27	27	50,5	52,6	9/21	9/21	73,5	73,0	31,6	30,2	-	-	-	-
Asgharian (2016 & 2017)	NAFLD	Iran	*B. brev., B. lon., S. ther., L. acid., L. del., L. rham., L. cas. gr.*	9,5E+09	8	38	36	46,6	47,8	7/33	12/22	74,5	73,7	29,2	28,0	90,1	88,8	26,6	24,5
Badehnoosh (2018)	GDM	Iran	*B. bif., L. acid., L. cas. gr.*	6,0E+09	6	30	30	28,8	27,8	0/30	0/30	74,2	74,5	28,3	28,4	-	-	-	-
Bahmani (2015)	T2DM	Iran	*L. spor.*	1,2E+10	8	27	27	52,0	53,4	-	15/66	75,1	76,8	29,8	30,5	-	-	-	-
Barreto (2014)	MetS	Brazil	*L. plan.*	1,0E+09	12	12	12	62,0	63,0	0/12	0/12	66,1	67,7	27,5	27,5	101,0	103,5	-	-

Study	Population	Country	Probiotics	Daily dose (cfu)	Trial length (week)	n		Mean age		Gender		Mean BW (kg)		Mean BMI (kg/m²)		Mean WC (cm)		Mean BFM (kg)	
						INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Behrouz (2017)	NAFLD	Iran	*B. brev., B. lon., L. acid., L. rham., L. cas. gr.*	1,0E+10	12	30	30	38,5	38,4	22/8	21/9	85,0	90,7	29,6	31,9	-	-	25,7	29,3
Bernini (2015)	MetS	Brazil	*B. lac.*	2,7E+10	6	26	25	-	58,5	-	-	-	-	30,8	35,8	105,0	107,0	-	-
Brahe (2015)	OB	Denmark	*L. cas. gr.*	9,4E+10	6	18	16	61,4	-	0/18	0/16	-	-	34,2	34,3	-	-	-	-
Burton (T1) (2017)	Healthy	UK	*S. ther., L. del., L. rham.*	3,0E+11	2	6	6	-	-	6/0	6/0	-	-	-	-	-	-	-	-
Burton (T2) (2017)	Healthy	UK	*S. ther., L. del., L.rham.*	3,0E+11	2	6	6	24,0	-	6/0	6/0	-	-	-	-	-	-	-	-
Chung (2016)	OB	Korea	*L. reut.*	1,0E+09	12	20	20	39,4	42,1	7/11	13/6	79,6	80,1	29,0	27,9	-	-	-	-
De Roos (1999)	Healthy	NL	*L. acid.*	2.7E+10	2	39	39	39,8	39,9	11/28	11/28	-	-	23,9	24,2	-	-	-	-
Dolatkhah (2015 & Hajifaraji 2018)	GDM	Iran	*B. lac., S. ther., L. acid. L. del.*	4,0E+09	8	27	29	28,1	26,5	0/27	0/29	83,3	78,6	-	-	-	-	-	-
Ebrahimi (2017)	T2DM	Iran	*B. brev., B. lon., S. ther., L. acid., L. del., L. rham., L. cas. gr.*	-	9	35	35	58,7	58,6	23/12	19/16	77,6	74,6	28,1	27,3	-	-	-	-
Ejtahed (2012)	T2DM	Iran	*B. lac., L. acid.*	4,0E+09	6	30	30	50,9	51,0	11/19	12/18	-	-	29,0	29,1	-	-	-	-
Ekhlasi (2016)	NAFLD	Iran	*B. brev., B. lon., S. ther., L. acid., L. del., L. rham., L. cas. g*	2,8E+09	8	15	15	25-64	25-64	-	-	-	-	27,3	27,8	93,6	96,5	-	-
Eslamparast (1) (2014)	NAFLD	Iran	*B. brev., B. long., S. ther., L. acid., L. del., L. rham., L. cas. gr.*	4,0E+08	28	26	26	46,4	45,7	14/12	11/15	-	-	32,1	31,3	-	-	-	-
Eslamparast (2) (2014)	MetS	Iran	*B. brev., B. long., S. ther., L. acid., L. del., L. rham., L. cas. gr.*	4,0E+08	28	19	19	47,5	46,1	-	-	-	-	32,1	31,5	-	-	-	-
Famouri (2017)	NAFLD, OB, children	Iran	*B. bif., B. lac., L. acid., L. rham.*	1,3E+10	12	32	32	12,7	12,6	16/18	18/16	-	-	-	-	82,2	81,4	-	-
Feizollahzadeh (2016)	T2DM	Iran	*L. plan.*	2,0E+07	8	20	20	56,9	53,6	11/9	10/10	-	-	26,7	26,6	-	-	-	-
Firouzi (2015 & 2016)	T2DM	Malaysia	*B. bif., B. lac., B. lon., Lc. lac., L. acid., L. cas. gr.*	6,0E+10	12	48	53	54,2	52,9	-	-	75,3	74,2	29,5	28,4	-	-	-	-
Firouzi (2015 & 2016)*	T2DM, M	Malaysia	*B. bif., B. lac., B. lon., Lc. lac., L. acid., L. cas. gr.*	6,0E+10	12	26	28	-	-	-	-	-	-	-	-	100,0	98,0	-	-
Firouzi (2015 & 2016)*	T2DM, F	Malaysia	*B. bif., B. lac., B. lon., Lc. lac., L. acid., L. cas. gr.*	6,0E+10	12	21	26	-	-	-	-	-	-	-	-	100,0	95,0	-	-
Goebel (2012)	OB, MetS, children	Denmark	*L. sal.*	1,0E+10	12	50	50	12,9	13,4	11/16	11/12	79,9	84,5	30,9	30,9	100,8	103,6	26,5	28,7

Study	Population	Country	Probiotics	Daily dose (cfu)	Trial length (week)	n		Mean age		Gender		Mean BW (kg)		Mean BMI (kg/m²)		Mean WC (cm)		Mean BFM (kg)	
						INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Gomes (2017)	OW, OB	Brazil	*B. bif., B. lac., Lc. lac., L. acid., L. cas. gr.*	2,0E+10	8	22	21	20-59	20-59	0/21	0/22	76,6	83,6	31,7	33,3	94,0	97,5	36,3	39,7
Hariri (2015)	T2DM	Iran	*L. plan.*	2,0E+07	8	20	20	56,9	53,6	11/9	10/10	70,8	71,6	26,7	26,6	-	-	-	-
Higashikawa (2016)	OW	Japan	*P. pen.*	1,0E+11	12	21	20	52,5	52,8	8/13	7/13	-	-	26,8	27,4	94,7	94,8	23,3	23,8
Higashikawa T1 (2010)	Healthy	Japan	*L. plan.*	2,0E+10	6	23	21	37,3	33,0	6/18	6/16	-	-	22,5	21,2	-	-	-	-
Higashikawa T2 (2010)	Healthy	Japan	*L. plan.*	2,0E+10	6	22	21	35,0	35,2	7/15	6/16	-	-	21,4	21,2	-	-	-	-
Hove (2015)	T2DM	Denmark	*L. hel.*	-	12	23	18	58,5	60,6	23/0	18/0	93,2	85,2	29,2	27,7	101,3	100,3	-	-
Hulston (2015)	Healthy	UK	*L. cas. gr.*	6,5E+09	4	8	9	25,0	24,2	7/1	7/2	73,4	72,1	23,5	24,2	-	-	-	-
Hutt T1 (2014)	Healthy	Estonia	*L. plan.*	1,0E+10	3	82	82	37,7	37,7	33/49	33/49	-	-	25,4	25,4	-	-	-	-
Hutt T2 (2014)	Healthy	Estonia	*L. plan.*	6,0E+09	3	43	43	34,2	34,2	11/32	11/32	-	-	23,8	23,8	-	-	-	-
Ibrahim T1 (2018)	Healthy	Malaysia	*B. bif., B. inf., B. lon., Lc. lac., L. acid., L. cas. gr.*	6,0E+10	12	10	10	23,0	22,0	10/0	10/0	63,0	61,4	21,8	21,1	-	-	12,9	11,4
Ibrahim T2 (2018)	Healthy, training	Malaysia	*B. bif., B. inf., B. lon., Lc. lac., L. acid., L. cas. gr.*	6,0E+10	12	9	12	22,3	21,0	9/0	12/0	64,1	60,6	22,1	21,1	-	-	13,5	11,2
Ilmonen (2011)	Pregnant	Finland	*B. lac., L. rham.*	2,0E+10	-6	85	86	29,7	30,1	0/85	0/86	-	-	-	-	-	-	-	-
Inoue (2003)	Mild HT	Japan	*B. lac., L. cas. gr.*	-	12	18	17	56,2	53,9	10/8	10/7	-	-	23,8	25,7	-	-	-	-
Ivey T1 (2014)	OW	Australia	*B. lac., L. acid.*	3,0E+09	6	37	40	68,4	65,4	25/12	23/17	-	-	30,2	30,8	-	-	-	-
Ivey T2 (2014)	OW	Australia	*B. lac., L. acid.*	6,0E+09	6	40	40	68,4	65,4	25/15		-	-	30,6	30,8	-	-	-	-
Ivey T3 (2014)	OW	Austraila	*B. lac., L. acid.*	3,0E+09	6	39	40	64,7	65,4	23/16		-	-	30,8	30,8	-	-	-	-
Jafarnejad (2016)	GDM	Iran	*B. brev., B. lac., S. ther., L. hel. L. acid., L. cas. gr., L. plan.*	1,1E+11	8	37	35	32,4	31,9	0/37	0/35	73,2	73,5	-	-	-	-	-	-
Jamilian (2016)	Pregnant	Iran	*B. bif., L. acid., L. cas. gr.*	*6,0E+09*	12	30	30	27,1	28,4	0/30	0/30	68,4	68,1	25,6	25,5	-	-	-	-
Javadi (2017)	NAFLD	Iran	*B. lon., L. acid.*	*2,0E+07*	13	17	19	43,2	38,7	14/3	16/3	89,9	88,5	32,3	31,0	-	-	-	
Jones (2018)	OB, children	USA	*B. brev., B. lac., S. ther., L. hel. L. acid., L. cas. gr., L. plan.*	*1,4E+13*	16	8	11	14,4	14,9	3/6	5/6	-	-	30,7	34,5	96,9	104,6	33,3	37,3
Jung (2013)	OW, OB	Korea	*L. gas.*	*6,0E+10*	12	31	31	20-50	20-50	13/15	5/20	77,2	77,4	28,6	29,6	95,5	96,4	27,6	27,6
Jung (2015 & Kim 2017)	OW	Korea	*L. cur., L. plan.*	1,0E+10	12	49	46	40,1	37,8	18/31	16/30	73,5	73,5	27,0	27,0	90,1	91,1	22,2	23,0

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						INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Kadooka (2013)	Healthy, VF	Japan	*L. gas.*	1,6E+10	12	69	70	46,9	47,4	33/36	36/34	-	-	27,5	27,2	93,9	94,6	24,0	24,2
Kadooka (2010)	Healthy, VF	Japan	*L. gas.*	1,0E+11	12	43	44	48,3	49,2	29/14	30/14	76,9	77,1	27,5	27,2	93,0	93,9	23,5	22,9
Karamali (2016)	GDM	Iran	*B. bif., L. acid., L. cas. gr.*	6,0E+09	6	30	30	31,8	29,7	0/60	-	76,5	73,0	28,6	28,5	-	-	-	-
Karbaschian (2018)	OB, GB	Iran	*B. brev., B. lon., S. ther., L. acid., L. del., L. rham., L. cas. gr.*	9,5E+09	16	23	23	32,4	37,0	0/23	0/23	120,0	119,3	44,6	45,0	123,9	121,1	-	-
Khalili (2018)	T2DM	Iran	*L. cas. gr.*	2,0E+09	8	20	20	44,0	45,0	7/13	7/13	77,2	83,5	29,5	31,9	97,5	102,9	-	-
Kijmanawat (2018)	GDM	Thailand	*B. bif., L. acid.*	1,0E+09	4	29	28	30,72	32,5	0/28	0/29	63,5	62,9	-	-	-	-	-	-
Kouchaki (2016)	MS	Iran	*B. bif., L. acid., L. fer., L. cas. gr.*	8,0E+09	12	30	30	34,4	33,8	5/25	5/25	71,5	67,7	25,4	24,7	-	-	-	-
Laitinen (2008)	Pregnant	Finland	*B. lact., L. rham.*	2,0E+10	up to 84	85	86	29,7	30,1	0/85	0/86	-	-	-	-	-	-	-	-
Lee T1 (2017)	Healthy	USA	*B. lact.*	3,2E+09	4	25	25	27,6	29,3	11/19	11/19	-	-	-	-	-	-	-	-
Lee T2 (2017)	Healthy	USA	*B. lact.*	3,2E+09	4	26	25	27,6	29,3	11/19		-	-	-	-	-	-	-	-
Lee (2014)	OW	Korea	*B. brev., B. lac., B. lon., S. ther., L. acid., L. rham., L. plan.*	1,0E+10	8	17	19	19-65	19-65	0/17	0/19	70,7	70,6	28,3	28,5	94,5	95,4	27,0	27,1
Lindsay (2015)	GDM, IGT pregnant	Ireland	*L. sal.*	1,0E+09	8	48	52	33,5	32,6	0/48	0/52	-	-	-	-	-	-	-	-
Lindsay (2014)	OB, pregnant	Ireland	*L. sal.*	1,0E+09	4	63	75	31,4	31,0	0/63	0/75	-	-	-	-	-	-	-	-
Madjd (2016)	OB	Iran	*B. lac., S. ther., L. acid., L. del.*	4,0E+09	12	44	45	32,2	31,8	0/89	-	82,7	82,5	32,1	32,1	101,2	101,3	-	-
Mahboobi (2014)	Prediabetes	Iran	*B. brev., B. lon., S. ther., L. acid., L. del., L. rham., L. cas. gr.*	5,3E+10	8	28	27	51,0	50,4	-	-	-	-	28,9	29,7	-	-	-	-
Manzhalii (2017)	NASH	Ukraine	*B. lon., S. ther., L. bif., L. del., L. rhamn., L. cas. gr.*	1,0E+08	12	38	37	44,3	43,5	11/27	16/21	-	-	26,4	26,6	-	-	-	-
Mazloom (2013)	T2DM	Iran	*L. acid., L. del., L. cas. gr.*	-	6	16	18	55,4	51,8	-	8/26	-	-	28,0	27,2	-	-	-	-
Minami (2015)	T2DM, OB	Japan	*B. brev.*	5,0E+10	12	19	25	58,9	61,9	6/13	11/14	68,9	71,2	27,1	27,7	-	-	21,5	23,5
Miraghajani (2017)	T2DM	Iran	*L. plan.*	4,0E+09	8	20	20	56,9	53,6	24/24	10/14	70,8	71,6	26,7	26,6	-	-	-	-
Mobini (2017)	T2DM	Sweden	*L. reut.*	1,0E+10	12	14	15	64,0	65,0	11/3	11/4	101,4	93,5	32,3	30,7	114,0	112,0	38,2	35,0
Mofidi (2017)	NAFLD	Iran	*B. brev., B. lon., S. ther., L. acid., L. rham., L. del., L. cas. gr.*	2,8E+09	28	21	21	40,1	44,6	11/10	12/9	-	-	23,2	23,2	-	-	-	-

Study	Population	Country	Probiotics	Daily dose (cfu)	Trial length (week)	n		Mean age		Gender		Mean BW (kg)		Mean BMI (kg/m²)		Mean WC (cm)		Mean BFM (kg)	
						INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Mohamadshahi (2014)	T2DM	Iran	*B. lac., L. acid.*	1,1E+09	8	20	20	53,0	49,0	-	10/32	74,7	79,3	28,4	29,2	101,9	107,7	27,0	29,4
Mohseni (2017)	T2DM	Iran	*B. bif., L. acid., L. fer., L. cas. gr.*	8,0E+09	12	30	30	62,6	58,5	20/10	20/10	76,0	71,3	26,4	25,3	-	-	-	-
Nabavi (2014 & 2015)	NAFLD	Iran	*B. lac., L. acid.*	2,5E+09	8	36	36	42,75	44,05	17/19	18/18	84,3	86,2	30,1	31,4	97,4	98,4	-	-
Naito (2017)	OB, Prediabetes	Japan	*L. cas. gr.*	1,0E+11	8	48	50	47,4	47,4	48/0	50/0	86,7	83,6	29,5	29,0	-	-	24,3	23,1
Naruszewicz (2002)	Healthy	Sweden	*L. plan.*	2,0E+10	6	18	18	42,3	41,8	-	-	-	-	24,8	25,8	-	-	-	-
Odamaki (2016)	Healthy	Japan	*B. lon., S. ther., L. del.*	4,0E+09	3	10	10	39,5	40,5	3/7	3/7	-	-	21,7	23,3	-	-	-	-
Ogawa (2014)	HTG	Japan	*L. gas.*	1,0E+11	4	20	20	51,1	51,1	15/5	15/5	70,7	70,5	24,5	24,5	85,4	87,4	-	-
Omar (2013)	Healthy	Canada	*L. amyl.*	1,4E+09	6	14	14	46,3	46,3	10/18	10/18	82,7	82,7	-	-	-	-	33,3	29,6
Omar (2013)	Healthy	Canada	*L. fer.*	1,1E+09	6	14	14	46,3	46,3	10/18	10/18	83,9	82,7	-	-	-	-	36,4	29,6
Ostadrahimi (2015)	T2DM	Iran	*B. brev., B. lac. S. ther., L. acid., L. cas. gr.*	2,9E+10	8	30	30	35-65	35-65	18/12	16/14	77,5	74,9	28,9	27,5	-	-	-	-
Osterberg (2015)	Healthy	USA	*B. lac., L. hel., L. acid., L. cas. gr., L. plan.*	1,1E+12	4	9	11	22,4	22,9	9/0	11/0	-	-	23,9	23,2	-	-	16,3	13,6
Rajkumar (2015)	Healthy	Japan	*L. sal.*	4,0E+12	6	15	15	20-25	20-25	6/7	6/7	-	-	22,3	22,7	-	-	-	-
Rajkumar (2014)	OW	India	*B. brev., B. lac., S. ther., L. hel., L. acid., L. cas. gr., L. plan.*	1,1E+12	6	15	15	49,0	49,0	8/7	8/7	-	-			-	-	-	-
Sabico (2017)	T2DM	Saudi Arabia	*B. bif., L. brev., B. lac., Lc. lac., L. acid., L. cas. gr., L. sal.*	5,0E+09	12	39	39	48,0	46,6	19/20	21/18	75,6	79,5	29,4	30,1	-	-	-	-
Sadrzadeh (2009)	OW	Iran	*B. lac., L. acid.*	1,2E+10	6	30	30	19-49	19-49	0/30	0/30	60,7	58,5	24,0	23,0	-	-	-	-
Safavi (2013)	OW, OB, children	Iran	*B. brev., B. lon., S. therm., L. acid., L. del., L. rham., L. cas. gr.*	2,0E+08	56	29	27	10,8	10,9	-	-	-	-	22,2	20,5	84,2	76,5	-	-
Sanchez (2013)	OB	Canada	*L. rham.*	3,2E+08	24	45	48	35,0	37,0	19/26	20/28	-	-	33,8	33,3	-	-	-	-
Sanchez (2013)*	OB, M	Canada	*L. rham.*	3,2E+08	24	19	20	-	-	19/0	20/0	-	-	34,0	33,5	-	-	-	-
Sanchez (2013)*	OB , F	Canada	*L. rham.*	3,2E+08	24	26	28	-	-	0/26	0/28	-	-	33,6	33,2	-	-	-	-
Sato (2017)	T2DM	Japan	*L. cas. gr.*	4,0E+10	16	34	34	64,0	65,0	29/5	20/14	-	-	24,2	24,6	-	-	-	-
Sepideh (2015)	NAFLD	Iran	*B. brev., B. lon., S. ther., L. acid., L. del., L. rham., L. cas. gr.*	6,2E+10	8	21	21	42,1	47,3	13/8	15/6	-	-	30,3	29,5	-	-	-	-

Study	Population	Country	Probiotics	Daily dose (cfu)	Trial length (week)	n		Mean age		Gender		Mean BW (kg)		Mean BMI (kg/m²)		Mean WC (cm)		Mean BFM (kg)	
						INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Sharafedtinov (2013)	OB, HT	Russia	*L. plan.*	7,5E+12	3	25	15	52,0	51,7	9/16	4/11	105,6	102,4	37,7	36,3	-	-	46,7	46,4
Shavakhi (2013)	NASH	Iran	*B. brev., B. lon., S. ther., L. acid., L. del., L. rham., L. cas. gr.*	1,9E+09	6	31	32	41,5	38,7	15/17	17/14	-	-	28,6	28,2	-	-	-	-
Sherf-Dagan (2017)	NAFLD, SG	Israel	*B. bif., B. brev., B. lon., S. ther., Lc. lac., L. acid., L. rham., L. cas. gr., L. plan.*	5,0E+10	26	40	40	42,1	44,2	18/22	16/24	-	-	42,1	42,1	-	-	-	-
Simon (2015)	NW, OB	Germany	*L. reut.*	2,0E+10	8	11	10	-	50,0	-	-	87,0	87,0	-	-	-	-	30,5	29,6
Stenman T1 (2016)	OW, OB	Finland	*B. lac.*	1,0E+10	26	48	53	50,6	48,8	9/39	12/41	88,7	88,5	31,5	31,2	102,6	103,4	36,6	36,4
Stenman T2 (2016)	OW, OB	Finland	*B. lac.*	1,0E+10	26	52	53	47,0	48,8	9,43		87,8	89,4	31,3	-	102,5	-	37,6	
Tajabadi-Ebrahimi (2016)	T2DM	Iran	*B. bif., L. acid., L. cas. gr.*	6,0E+09	12	30	30	64,2	64,0	-		79,2	74,3	32,3	29,6	-	-	-	-
Tajadadi (2014)	OW, T2DM, CHD	Iran	*L. spor.*	1,2E+10	8	27	27	52,0	53,4	5/22	5/22	-	-	27,5	27,9	-	-	-	-
Takahashi (2016)	Healthy	Japan	*B. lac.*	8,0E+10	12	69	68	46,9	46,9	46/23	41/27	75,0	74,9	26,8	26,9	-	-	-	-
Tonucci (2015)	T2DM	Brazil	*B. lac., L. acid.*	1,0E+09	6	23	22	51,8	51,0	12/11	14/8	-	-	-	-	-	-	-	-
Tripolt (2013)	MetS	Austria	*L. cas. gr.*	2,0E+10	12	30	30	51,0	55,0	9/4	9/6	-	-	34,9	31,4	-	-	-	-
Vajro (2011)	OB, NAFLD, children	Italy	*L. rham.*	1,2E+10	8	10	10	10,7	10,7	18/2	18/2	-	-	24,3	22,5	-	-	-	-
Zarrati (2014)	OW, OB	Iran	*B. lac., L. acid., L. cas. gr.*	6,0E+09	8	25	25	36,0	36,0	-	24/51	90,6	87,0	33,8	33,9	113,3	110,3	-	-

*These trials were only used for subgroup analysis by gender.

Heading: CTL, Control group; INT, Intervention group; Gender, females/males.

Outcomes: BFM, Body fat mass; BMI, Body mass index; BW, Body weight; WC, Waist circumference

Populations: AD, Alzheimer's disease; BP, blood pressure; CHD, coronary heart disease; F, females; GB, gastric bypass; GDM, gestational diabetes mellitus; HT, hypertension; HTG, hypertriglyceridemia; IGT, impaired glucose tolerance; LVF, large visceral fat; M, males; MDD, major depressive disorder; NAFLD, non-alcoholic fatty liver disease; NASH, non-alcoholic steatohepatitis; NGT, normal glucose tolerance; NW, normal weight; MS, multiple sclerosis; MetS, Metabolic syndrome; OB, obese; OW, overweight; SG, sleeve gastrectomy; T2DM, type 2 diabetes mellitus.

Species: *B. brev, Bifidobacterium breve; B. lac., Bifidobacterium animalis* subsp. *lactis; B. lon., Bifidobacterium longum; L. acid., Lactobacillus acidophilus; L. amyl., Lactobacillus amylovorus; L. bifid., Lactobacillus bifidum; L. del., Lactobacillus delbrueckii; L. cas. gr., Lactobacillus casei or paracasei; L. cur., Lactobacillus curvatus; L. fer., Lactobacillus fermentum; L. gas., Lactobacillus gasseri; L. hel., Lactobacillus helveticus; L. plan., Lactobacillus plantarum; L. reut., Lactobacillus reuteri; L. rham., Lactobacillus rhamnosus; L. sal., Lactobacillus salivarius; L. spor., Lactobacillus sporogenes (Bacillus coagulans); Lc. lact, Lactococcus lactis; S. therm., Streptococcus salivarius* subsp. *thermophilus, P.pen; Pediococcus pentosaceus.*

Supplementary Table 2: Characteristics of included randomized controlled trials of probiotics: glucose homeostasis, systemic inflammation, liver ezymes and triglycerides.

Study	Mean FG (mmol/l)		Mean HbA_{1c} (%)		Mean INS (mU/l)		Mean HOMA-IR		Mean CRP (mg/l)		Mean TG (mg/dl)		Mean ALAT (U/l)		Mean ASAT (U/l)		Mean GGT (U/l)	
	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Agerholm-Larsen (2000)	-	-	-	-	-	-	-	-	-	-	126,7	177,1	-	-	-	-	-	-
Agerholm-Larsen (2000)	-	-	-	-	-	-	-	-	-	-	138,2		-	-	-	-	-	-
Ahmadi (2016)	5,3	5,1	-	-	13,1	13,3	3,1	3,1	-	-	171,3	181,1	-	-	-	-	-	-
Ahn (2015)	5,0	5,0	-	-	9,2	9,7	2,0	2,2	1,3	1,1	210,2	207,0	-	-	-	-	-	-
Akbari (2016)	5,1	4,6	-	-	-	-	1,3	1,4	6,6	4,5	119,6	84,3	-	-	-	-	-	-
Akkasheh (2016)	5,7	5,0	-	-	-	-	-	-	-	-	126,1	105,0	-	-	-	-	-	-
Alisi (2014)	-	-	-	-	-	-	4,3	4,7	-	-	99,0	98,0	34,0	42,0	-	-	-	-
Aller (2011)	6,4	6,1	-	-	14,5	13,4	4,5	4,2	-	-	171,1	134,8	-	-	-	-	-	-
Andreasen (2010)	-	-	-	-	-	-	-	-	1,3	1,5	-	-	-	-	-	-	-	-
Asemi (1) (2014)	8,2	9,3	-	-	8,8	8,1	3,1	3,3	-	-	137,3	169,9	-	-	-	-	-	-
Asemi (2) (2013)	5,3	5,1	-	-	8,8	6,9	2,1	1,5	-	-	-	-	-	-	-	-	-	-
Asemi (3) (2013)	8,0	7,5	7,7	6,4	5,7	5,8	2,0	2,0	2,8	2,1	159,5	134,0	-	-	-	-	-	-
Asgharian (2016 & 2017)	5,4	5,6	-	-	-	-	-	-	1,8	1,0	162,6	174,7	23,8	27,9	24,7	24,8	-	-
Badehnoosh (2018)	5,2	5,1	-	-	-	-	-	-	6,7	6,5	-	-	-	-	-	-	-	-
Bahmani (2015)	-	-	-	-	-	-	-	-	-	-	-	-	24,3	23,7	23,3	22,4	-	-
Barreto (2014)	6,0	5,5	-	-	12,7	9,4	3,6	2,5	1,1	2,1	154,5	118,0	-	-	-	-	39,5	27,0
Behrouz (2017)	5,1	5,5	-	-	16,7	17,4	3,8	4,7	-	-	-	-	-	-	-	-	-	-
Bernini (2015)	5,2	5,4	-	-	13,4	13,9	3,4	3,6	-	-	163,0	199,0	-	-	-	-	-	-
Brahe (2015)	5,9	5,8	-	-	15,7	12,3	5,1	3,9	2,9	4,1	149,7	94,8	-	-	-	-	-	-
De Roos (1999)	-	-	-	-	-	-	-	-	-	-	100,1	108,1	-	-	-	-	-	-
Dolatkhah (2015 & Hajifaraji 2018)	5,8	5,6	-	-	6,0	5,6	1,5	1,4	8,2	8,9	-	-	-	-	-	-	-	-
Ebrahimi (2017)	7,9	7,4	7,4	7,5	-	-	-	-	-	-	144,9	122,0	-	-	-	-	-	-
Ejtahed (2012)	8,1	7,4	7,3	6,9	7,5	6,3	-	-	-	-	-	-	-	-	-	-	-	-
Ekhlasi (2016)	6,4	6,0	-	-	2,2	2,1	-	-	-	-	187,5	182,8	38,1	33,9	38,0	32,0	-	-

Study	Mean FG (mmol/l)		Mean HbA_{1c} (%)		Mean INS (mU/l)		Mean HOMA-IR		Mean CRP (mg/l)		Mean TG (mg/dl)		Mean ALAT (U/l)		Mean ASAT (U/l)		Mean GGT (U/l)	
	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Eslamparast (1) (2014)	5,5	5,5	-	-	11,2	11,1	2,8	2,7	4,2	4,3	-	-	69,3	71,5	66,4	68,3	89,5	89,0
Eslamparast (2) (2014)	5,6	5,8	-	-	9,9	10,5	2,6	2,8	-	-	228,5	235,6	-	-	-	-	-	-
Famouri (2017)	-	-	-	-	-	-	-	-	-	-	112,5	96,0	32,8	28,9	32,2	30,2	-	-
Feizollahzadeh (2016)	7,4	7,5	-	-	-	-	-	-	4,5	5,3	287,0	271,0	-	-	-	-	-	-
Firouzi T1 (2015 & 2016)	7,3	7,9	7,5	7,3	13,1	12,0	3,1	3,8	-	-	121,3	108,9	23,2	32,5	26,8	20,1	-	-
Goebel (2012)	5,2	5,3	-	-	14,5	15,1	4,0	4,3	2,1	2,5	97,4	108,1	-	-	-	-	-	-
Gomes (2017)	-	-	6,1	6,5	-	-	-	-	-	-	132,9	141,7	-	-	-	-	-	-
Higashikawa (2016)	5,6	5,4	5,2	5,2	7,5	8,6	1,9	2,1	-	-	127,9	114,6	-	-	-	-	-	-
Higashikawa T1 (2010)	-	-	-	-	-	-	-	-	-	-	-	-	20,7	16,2	20,4	18,9	23,0	23,9
Higashikawa T2 (2010)	-	-	-	-	-	-	-	-	-	-	-	-	31,1	16,2	23,8	18,9	37,0	23,9
Hove (2015)	8,0	9,1	6,8	7,3	6,9	6,0	3,6	2,5	0,7	1,6	124,0	124,0	-	-	-	-	-	-
Hulston (2015)	5,8	5,3	-	-	11,2	11,9	-	-			124,0	124,0	-	-	-	-	-	-
Hutt T1 (2014)	5,3	5,2	-	-	-	-	-	-	1,0	1,0	97,4	97,4	-	-	-	-	-	-
Hutt T2 (2014)	5,0	5,0	-	-	-	-	-	-	0,7	0,8	88,6	88,6	-	-	-	-	-	-
Ilmonen (2011)	4,9	5,0	-	-	-	-	1,1	1,2	-	-	-	-	-	-	-	-	-	-
Inoue (2003)	5,4	5,6	-	-	-	-	-	-	-	-	139,9	134,4	28,1	26,4	27,0	23,5	-	-
Ivey T1 (2014)	5,6	5,4	5,9	5,6	9,6	10,0	2,5	2,4	-	-	150,6	135,5	-	-	-	-	-	-
Ivey T2 (2014)	5,5	-	5,7	-	9,9	-	2,5	-	-	-	150,6	-	-	-	-	-	-	-
Ivey T3 (2014)	5,6	-	5,8	-	9,8	-	2,5	-	-	-	139,9	-	-	-	-	-	-	-
Jafarnejad (2016)	5,1	5,2	4,8	4,6	19,1	18,7	4,3	4,4	5,7	5,0	-	-	-	-	-	-	-	-
Jamilian (2016)	4,5	4,6	-	-	11,1	12,8	2,3	-	7,9	4,8	156,1	141,5	-	-	-	-	-	-
Javadi (2017)	5,7	5,6	-	-	5,9	4,6	1,5	1,1	-	-	190,6	172,1	58,1	49,1	51,6	42,7	43,7	31,4
Jung (2013)	5,7	5,8	5,8	5,8	10,6	9,9	-	-	-	1,3	144,5	124,4	24,6	24,3	-	-	33,6	36,0
Jung (2015 & Kim 2018)	4,7	4,6	-	-	0,1	0,1	-	-	1,4	-	107,6	106,8	-	-	-	-	-	-
Kadooka (2010)	5,2	5,2	5,3	5,3	11,6	9,9	-	-	-	-	131,3	136,8	27,8	26,5	21,7	21,8	39,3	40,0
Karamali (2016)	5,4	5,1	-	-	12,0	13,2	2,9	3,0	-	-	192,7	187,7	-	-	-	-	-	-

Study	Mean FG (mmol/l)		Mean HbA_{1c} (%)		Mean INS (mU/l)		Mean HOMA-IR		Mean CRP (mg/l)		Mean TG (mg/dl)		Mean ALAT (U/l)		Mean ASAT (U/l)		Mean GGT (U/l)	
	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Karbaschian (2018)	5,7	5,5	-	-	17,2	16,9	12,5	12,4	8,1	8,8	162,1	153,4	-	-	-	-	-	-
Khalili (2018)	9,1	8,3	7,3	6,8	17,2	17,9	-	-	-	-	-	-	-	-	-	-	-	-
Kijmanawat (2018)	4,6	4,6	-	-	8,8	6,8	1,8	1,4	-	-	-	-	-	-	-	-	-	-
Laitinen (2008)	4,7	4,7	5,0	5,0	6,3	5,1	1,3	1,1	-	-	-	-	-	-	-	-	-	-
Lee (2014)	5,4	5,6	-	-	-	5,1	-	1,1	-	-	191,0	132,0	-	-	-	-	-	-
Lee T1 (2017)	4,8	4,8	-	-	5,1	-	1,1	-	2,1	2,1	90,4	90,4	-	-	-	-	-	-
Lee T2 (2017)	4,8	-	-	-	5,1	-	1,1	-	2,1	2,1	90,4	-	-	-	-	-	-	-
Lindsay (2015)	4,8	4,9	-	-	13,9	14,6	3,0	3,3	-	-	217,9	212,6	-	-	-	-	-	-
Lindsay (2014)	4,7	4,8	-	-	13,9	16,7	2,9	3,5	7,9	8,4	153,2	177,1	-	-	-	-	-	-
Madjd (2016)	5,1	5,0	5,1	5,0	12,9	12,7	2,9	2,9	-	-	131,1	131,1	-	-	-	-	-	-
Mahboobi (2014)	-	-	-	-	-	-	-	-	-	-	151,5	170,3	-	-	-	-	-	-
Manzhalii (2017)	4,9	5,0	-	-	-	-	-	-	-	-	129,3	122,2	56,8	52,4	43,1	41,9	59,7	64,6
Mazloom (2013)	8,8	8,3	-	-	11,8	7,2	2,9	1,7	3,2	2,2	182,2	178,7	-	-	-	-	-	-
Minami (2015)	9,9	8,6	7,5	7,0	32,0	39,9	-	-	1,0	0,9	-	-	34,0	28,6	29,7	26,4	37,0	39,0
Mobini T1 (2017)	13,9	11,9	8,1	7,7	-	-	-	-	2,0	3,3	159,4	186,0	30,0	34,7	23,5	25,9	-	-
Mofidi (2017)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63,6	72,7	-	-
Mohamadshahi (2014)	9,7	10,4	8,2	8,3	-	-	-	-	3,3	3,1	-	-	-	-	-	-	-	-
Mohseni (2017)	12,5	11,2	8,0	7,9	17,4	16,5	9,8	8,5	-	-	137,6	134,9	-	-	-	-	-	-
Nabavi (2014)	5,0	4,8	-	-	1,0	1,0	2,5	2,1	-	-	194,2	197,5	31,5	25,5	32,5	26,0	-	-
Naito (2017)	6,1	6,1	5,7	5,8	8,0	7,9	2,2	2,2	-	-	153,4	160,3	-	-	-	-	-	-
Naruszewicz (2002)	6,1	5,7	-	-	11,1	8,3	-	-	-	-	121,3	124,0	-	-	-	-	-	-
Odamaki (2016)	4,4	4,4	5,3	5,2	-	-	-	-	0,5	0,2	118,0	80,0	16,0	17,0	19,0	20,0	36,0	20,0
Ogawa (2014)	5,2	5,2	5,1	5,0	10,6	9,0	-	-	-	-	268,3	246,5	23,2	24,8	21,0	20,8	48,3	49,2
Ostadrahimi (2015)	9,0	10,2	7,6	7,0	-	-	-	-	-	-	179,3	176,7	-	-	-	-	-	-
Osterberg (2015)	4,5	4,0	-	-	6,1	5,2	-	-	2,0	1,4	-	-	-	-	-	-	-	-
Rajkumar (2015)	4,7	4,7	-	-	18,7	18,8	3,7	3,9	2,6	2,7	111,0	112,0	-	-	-	-	-	-

Study	Mean FG (mmol/l)		Mean HbA_{1c} (%)		Mean INS (mU/l)		Mean HOMA-IR		Mean CRP (mg/l)		Mean TG (mg/dl)		Mean ALAT (U/l)		Mean ASAT (U/l)		Mean GGT (U/l)	
	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL	INT	CTL
Rajkumar (2014)	4,9	5,0	-	-	18,4	17,9	4,0	3,9	5,6	5,3	140,7	128,0	-	-	-	-	-	-
Sabico (2017)	11,7	7,0	-	-	9,9	13,1	5,3	4,1	-	-	221,4	194,9	-	-	-	-	-	-
Sadrzadeh (2009)	-	-	-	-	-	-	-	-	-	-	98,3	78,8	-	-	-	-	-	-
Safavi (2013)	4,8	4,8	-	-	-	-	-	-	-	-	133,7	115,1	-	-	-	-	-	-
Sanchez (2013)	4,9	5,1	-	-	-	-	-	-	4,6	5,4	-	-	-	-	-	-	-	-
Sanchez (2013)*	5,3	5,5	-	-	-	-	-	-	3,9	3,0	-	-	-	-	-	-	-	-
Sanchez (2013)*	4,6	4,9	-	-	-	-	-	-	5,1	6,8	-	-	-	-	-	-	-	-
Sato (2017)	7,1	7,2	6,9	6,8	-	-	-	-	-	-	104,7	109,4	-	-	-	-	-	-
Sepideh (2015)	5,4	5,4	5,9	5,8	11,2	12,5	2,7	3,0	-	-	-	-	-	-	-	-	-	-
Sharafedtinov (2013)	7,2	6,8	-	-	-	-	-	-	-	-	248,0	189,5	32,8	45,3	23,5	31,5	-	-
Shavakhi (2013)	5,5	5,5	-	-	-	-	-	-	-	-	260,5	242,5	133,7	118,4	123,1	125,3	-	-
Sherf-Dagan (2017)	5,1	5,1	5,8	5,8	-	-	6,5	5,6	11,5	12,3	155,8	156,7	36,5	36,6	27,3	26,6	36,7	36,5
Simon (2015)	-	-	-	-	-	-	-	-	1,7	1,7	-	-	-	-	-	-	-	-
Stenman T1 (2016)	5,2	5,2	-	-	9,1	8,3	2,1	2,0	2,8	1,7	113,4	108,1	-	-	-	-	-	-
Stenman T2 (2016)	5,2	5,2	-	-	8,4	7,8	2,0	1,9	2,5	2,2	115,1	112,5	-	-	-	-	-	-
Tajabadi-Ebrahimi (2016)	8,3	7,0	-	-	16,2	16,5	5,6	5,2	-	-	142,0	127,9	-	-	-	-	-	-
Tajadadi (2014)	7,2	9,4	-	-	8,2	7,8	2,7	3,3	5,9	3,9	-	-	-	-	-	-	-	-
Tonucci (2015)	7,9	7,4	6,1	5,4	7,5	8,3	2,6	2,2	-	-	141,7	162,1	-	-	-	-	-	-
Tripolt (2013)	6,1	6,1	-	-	11,7	11,6	3,1	3,2	3,7	4,9	-	-	-	-	-	-	-	-
Vajro (2011)	-	-	-	-	-	-	-	-	-	-	-	-	70,3	63,6	-	-	-	-

*These trials were only used for subgroup analysis by gender.

Heading: CTL, Control group; INT, Intervention group; Gender, females/males.

Outcomes: ALAT, alanine aminotransferase; ASAT, aspartate aminotransferase; CRP, C-reactive protein; FG, Fasting glucose; GGT, gamma-glutamyl transferase; HbA_{1c}, glycated haemoglobin; HOMA-IR, homeostatic model of insulin resistance; INS, insulin; TG, triglycerides.

SI conversion factors: To convert CRP to nmol/L, multiply values by 9.524. To convert ALAT, ASAT, and GGT to µkat/L multiply values by 0.0167. To convert triglycerides to mmol/L, divide values by 88.57.

Supplementary Table 3. PEDro tool based quality score based on 10 factors, according to a standardized procedure and classified studies as high quality (≥8 points), moderate quality (>6 and <8 points), or low quality.

Study	Random Allocation	Allocation Concealment	Similar at baseline	Blinding (subjects)	Blinding (therapists)	Blinding (outcome assessors)	Key outcome measurement min 85% (LFU max 15%)	Intention to treat	Between group comparison	Measure of variability	Quality
Agerholm-Larsen (2000)	1	1	1	1	1	1	1	1	1	1	10
Ahmadi (2016)	1	1	1	1	1	1	1	1	1	1	10
Ahn (2015)	1	1	1	1	1	1	1	1	1	1	10
Aihara (2005)	1	1	1	1	1	1	1	1	1	1	10
Akbari (2016)	1	0	1	1	1	0	1	1	1	1	8
Akkasheh (2016)	1	1	0	1	1	1	1	1	1	1	9
Alisi (2014)	1	1	0	1	1	1	1	0	1	1	8
Aller (2011)	1	0	1	1	1	0	1	0	0	1	6
Andreasen (2010)	1	0	1	1	1	0	1	0	1	1	7
Asemi (1) (2014)	1	0	1	1	0	0	1	0	1	1	6
Asemi (2) (2013)	1	0	1	1	1	0	1	0	1	1	7
Asemi (3) (2013)	1	0	1	1	1	0	1	0	1	1	7
Asgharian (2016)	1	1	1	1	1	1	1	0	1	1	9
Badehnoosh (2018)	1	1	1	1	1	1	1	1	1	1	10
Bahmani (2015)	1	1	1	1	1	1	1	1	1	1	10
Barreto (2014)	0	0	1	0	0	0	1	0	1	1	4
Behrouz (2017)	1	0	1	1	1	1	1	1	1	1	9
Bernini (2015)	1	0	1	0	0	0	1	1	0	1	5
Brahe (2015)	1	1	1	1	1	1	1	0	1	1	9
Burton (2017)	1	1	1	1	1	1	1	0	1	1	9
Chung (2016)	1	0	0	1	1	1	1	1	1	1	8
De Roos (1999)	1	0	0	1	1	1	1	0	1	1	7

Study	Random Allocation	Allocation Concealment	Similar at baseline	Blinding (subjects)	Blinding (therapists)	Blinding (outcome assessors)	Key outcome measurement min 85% (LFU max 15%)	Intention to treat	Between group comparison	Measure of variability	Quality
Dolatkhah (2015)	1	1	1	1	1	1	1	1	1	1	10
Ebrahimi (2017)	1	1	1	1	1	1	1	1	1	1	10
Ejtahed (2012)	1	1	1	1	1	1	1	0	1	1	9
Ekhlasi (2016)	1	1	1	1	1	1	1	0	1	1	9
Eslamparast (1) (2014)	1	0	1	1	1	0	1	1	1	1	8
Eslamparast (2) (2014)	1	0	1	1	1	0	1	1	1	1	8
Famouri (2017)	1	1	1	1	1	1	1	1	1	1	10
Feizollahzadeh (2016)	1	1	1	1	1	1	0	0	1	1	8
Firouzi (2015)	1	1	1	1	1	1	1	1	1	1	10
Goebel (2012)	1	1	1	1	1	1	1	0	0	1	8
Gomes (2017)	1	1	1	1	1	1	0	0	1	1	8
Hariri (2015)	1	1	1	1	1	1	0	0	1	1	8
Higashikawa (2016)	1	1	1	1	1	1	1	1	1	1	10
Higashikawa (2010)	1	1	1	1	1	1	1	0	1	1	9
Hove (2015)	1	1	1	1	1	1	1	1	1	1	10
Hulston (2015)	1	0	1	0	0	0	1	1	1	1	6
Hutt (2014)	1	0	0	1	1	0	1	1	1	1	7
Ibrahim (2018)	1	0	1	0	0	0	0	0	0	1	3
Ilmonen (2011)	1	1	1	1	1	1	0	0	1	1	8
Inoue (2003)	1	1	1	1	1	1	1	1	1	1	10
Ivey (2014)	1	1	1	1	1	1	1	0	1	1	9
Jafarnejad (2016)	1	1	1	1	1	1	0	0	1	1	8
Jamilian (2016)	1	1	1	1	1	1	1	1	1	1	10
Javadi (2017)	1	1	1	1	1	1	1	0	1	1	9
Jones (2018)	1	0	1	1	1	1	1	0	1	1	8
Jung (2013)	1	0	1	1	1	0	1	0	1	1	7

Study	Random Allocation	Allocation Concealment	Similar at baseline	Blinding (subjects)	Blinding (therapists)	Blinding (outcome assessors)	Key outcome measurement min 85% (LFU max 15%)	Intention to treat	Between group comparison	Measure of variability	Quality
Jung (2015)	1	0	1	1	1	1	0	0	1	1	7
Kadooka (2013)	1	1	1	1	1	1	1	1	1	1	10
Kadooka (2010)	1	0	1	1	1	0	1	1	1	1	8
Karamali (2016)	1	0	1	1	1	1	1	1	1	1	9
Karbaschian (2018)	1	1	1	1	1	1	1	0	1	1	9
Khalili (2018)	1	1	1	1	1	1	1	1	1	1	10
Kijmanawat (2018)	1	0	1	1	1	1	1	0	1	1	8
Kouchaki (2016)	0	1	1	1	1	1	1	1	1	1	9
Laitinen (2008)	1	1	1	1	1	1	0	0	1	1	8
Lee (2017)	1	0	1	0	0	1	0	0	1	1	5
Lee (2014)	1	0	1	1	1	0	0	0	1	1	6
Lindsay (2015)	1	1	1	1	1	1	1	1	1	1	10
Lindsay (2014)	1	1	1	1	1	1	1	1	1	1	10
Madjd (2016)	1	0	1	1	1	0	1	1	1	1	8
Mahboobi (2014)	1	0	1	1	1	0	1	0	1	1	7
Manzhalii (2017)	1	0	1	0	0	0	1	1	1	1	6
Mazloom (2013)	1	0	1	1	0	0	1	1	0	1	6
Minami (2015)	1	0	1	1	1	0	1	0	1	1	7
Miraghajani (2017)	1	1	1	1	1	1	0	0	1	1	8
Mobini (2017)	1	0	1	1	1	0	1	0	1	1	7
Mofidi (2017)	1	0	1	1	1	1	0	0	1	1	7
Mohamadshahi (2014)	1	0	1	1	1	0	1	0	1	1	7
Mohseni (2017)	1	1	1	1	1	1	1	1	1	1	10
Nabavi (2014)	1	1	1	1	1	1	1	1	1	1	10
Naito (2017)	1	1	1	1	1	1	1	0	1	1	9
Naruszewicz (2002)	1	0	1	1	1	0	1	1	1	1	8

Study	Random Allocation	Allocation Concealment	Similar at baseline	Blinding (subjects)	Blinding (therapists)	Blinding (outcome assessors)	Key outcome measurement min 85% (LFU max 15%)	Intention to treat	Between group comparison	Measure of variability	Quality
Odamaki (2016)	1	0	1	0	0	0	1	0	1	1	5
Ogawa (2014)	1	0	1	1	0	0	1	0	1	1	6
Omar (2013)	1	0	1	1	1	0	1	1	1	1	8
Ostadrahimi (2015)	1	0	1	1	1	0	1	1	1	1	8
Osterberg (2015)	1	0	1	1	1	0	1	1	1	1	8
Rajkumar (2015)	1	1	1	1	1	1	1	1	1	1	10
Rajkumar (2014)	1	1	1	1	1	1	1	1	1	1	10
Sabico (2017)	1	1	1	1	1	1	0	1	1	1	9
Sadrzadeh (2009)	1	1	1	1	1	1	1	0	1	1	9
Safavi (2013)	1	0	1	1	1	1	0	0	1	1	7
Sanchez (2013)	1	0	1	1	1	0	0	0	1	1	6
Sato (2017)	1	0	1	0	0	0	1	0	0	1	4
Sepideh (2015)	1	1	1	1	1	1	1	1	1	1	10
Sharafedtinov (2013)	1	0	1	1	1	0	1	1	1	1	8
Shavakhi (2013)	1	0	1	1	1	0	1	0	1	1	7
Sherf-Dagan (2017)	1	1	1	1	1	1	0	0	1	1	8
Simon (2015)	1	0	1	1	1	0	1	1	0	1	7
Stenman (2016)	1	1	1	1	1	1	1	1	1	1	10
Tajabadi-Ebrahimi (2016)	1	1	1	1	1	1	1	1	1	1	10
Tajadadi (2014)	1	1	1	1	1	1	1	1	1	1	10
Takahashi (2016)	1	1	1	1	1	1	0	0	1	1	8
Tonucci (2015)	1	1	1	1	1	1	1	1	1	1	10
Tripold (2013)	1	0	1	0	0	0	1	1	1	1	6
Vajro (2011)	1	0	1	1	1	0	1	1	1	1	8
Zarrati (2014)	1	0	1	1	1	0	1	1	1	1	8

Supplementary Table 4. Effect of probiotics on body weight and body mass index. Subgroup analysis by study quality, study populations, daily dose (in CFU), food form, number of strains, species and subspecies.

	BW(kg)									BMI (kg/m²)								
	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P
All studies	58	3422	0,06	22,6%	0,068	**-0,39**	**-0,57**	**-0,21**	**<0,001**	68	4015	**0,38**	**86,3%**	**<0,001**	**-0,33**	**-0,53**	**-0,12**	**0,002**
Excl. low quality studies	49	2978	**0,09**	**30,5%**	**0,025**	**-0,42**	**-0,62**	**-0,22**	**<0,001**	55	3389	**0,23**	**79,3%**	**<0,001**	**-0,29**	**-0,48**	**-0,10**	**0,002**
Excl. low/medium quality studies	41	2593	**0,09**	**33,6%**	**0,021**	**-0,35**	**-0,57**	**-0,14**	**<0,001**	44	2656	**0,14**	**71,5%**	**<0,001**	**-0,26**	**-0,43**	**-0,08**	**0,004**
Excl. studies with children	57	3322	0,07	24,0%	0,057	**-0,39**	**-0,57**	**-0,21**	**<0,001**	63	3776	**0,32**	**83,8%**	**<0,001**	**-0,34**	**-0,54**	**-0,13**	**0,001**
Excl. studies with pregnant women	51	2987	0,00	0,0%	0,859	**-0,70**	**-0,90**	**-0,50**	**<0,001**	64	3765	**0,44**	**86,2%**	**<0,001**	**-0,38**	**-0,61**	**-0,15**	**0,001**
Excl. studies with gastric bypass	57	3376	0,05	19,1%	0,111	**-0,38**	**-0,55**	**-0,21**	**<0,001**	66	3889	**0,38**	**86,5%**	**<0,001**	**-0,33**	**-0,53**	**-0,12**	**0,002**
Excl. studies from Iran	30	1741	0,05	11,7%	0,284	**-0,63**	**-0,89**	**-0,36**	**<0,001**	40	2373	**0,44**	**87,7%**	**<0,001**	**-0,37**	**-0,66**	**-0,08**	**0,012**
NW	7	280	0,00	0,0%	1,000	0,17	-0,38	0,72	0,539	16	712	0,00	0,0%	1,000	0,08	-0,10	0,25	0,410
OW	25	1644	0,00	0,0%	0,779	**-0,94**	**-1,17**	**-0,70**	**<0,001**	32	2196	**0,56**	**91,9%**	**<0,001**	**-0,55**	**-0,86**	**-0,23**	**0,001**
OB	20	1084	0,00	0,0%	0,999	-0,33	-0,85	0,18	0,204	16	857	0,00	0,0%	0,795	0,03	-0,13	0,19	0,719
IFG	9	393	0,00	0,0%	0,650	-0,38	-0,97	0,21	0,203	13	560	0,00	0,0%	0,942	-0,17	-0,35	<0,001	0,050
T2DM	16	943	0,00	0,0%	0,942	**-0,84**	**-1,20**	**-0,47**	**<0,001**	16	952	**0,19**	**62,6%**	**<0,001**	-0,31	-0,68	0,06	0,100
GDM	6	375	**0,04**	**55,8%**	**0,046**	-0,09	-0,34	0,15	0,447	3	190	0,00	0,0%	0,825	0,03	-0,11	0,16	0,715
NAFLD	5	276	0,00	0,0%	0,967	**-1,83**	**-3,49**	**-0,17**	**0,031**	11	588	**1,95**	**88,5%**	**<0,001**	**-1,21**	**-2,18**	**-0,24**	**0,014**
Dose > 10^7 & ≤ 10^8	2	76	0,00	0,0%	0,989	-0,01	-5,03	5,01	0,998	2	76	0,00	0,0%	0,798	0,08	-1,58	1,74	0,927
Dose > 10^8 & ≤ 10^9	3	245	0,00	0,0%	0,965	-0,12	-3,75	3,51	0,948	4	283	**5.58**	**98,6%**	**<0,001**	-0,46	-2,95	2,03	0,719
Dose > 10^9 & ≤ 10^{10}	25	1323	0,10	33,0%	0,057	-0,24	-0,51	0,03	0,080	26	1383	**0.18**	**73,9%**	**<0,001**	**-0,28**	**-0,52**	**-0,03**	**0,026**
Dose > 10^{10} & ≤ 10^{11}	20	1300	0,00	0,0%	1,000	**-0,92**	**-1,27**	**-0,57**	**<0,001**	24	1691	**0.06**	**42,9%**	**0,014**	**-0,32**	**-0,52**	**-0,12**	**0,002**
Dose > 10^{11} & ≤ 10^{12}	6	367	**0,31**	**75,9%**	**0,001**	0,44	-1,06	0,18	0,161	8	391	**0.31**	**90,7%**	**<0,001**	**-0,48**	**-0,96**	**-0,01**	**0,045**
Pill	34	2017	**0.09**	**38,2%**	**0,014**	-0,38	-0,60	**-0,17**	**<0,001**	41	2337	**0.56**	**91,4%**	**<0,001**	**-0,41**	**-0,69**	**-0,12**	**0,005**
FM & Y	16	937	0,14	16,8%	0,261	-0,46	-0,96	0,05	0,077	17	1139	0.02	23,0%	0,187	**-0,24**	**-0,41**	**-0,06**	**0,009**
n strains=1	24	1469	0,00	0,0%	0,573	**-0,80**	**-1,11**	**-0,49**	**<0,001**	30	1866	0.00	2,9%	0,420	**-0,26**	**-0,36**	**-0,15**	**<0,001**
n strains=2	9	446	0,00	0,0%	0,435	**-0,32**	**-0,61**	**-0,03**	**0,033**	8	443	0.00	0,0%	0,999	**-0,36**	**-0,57**	**-0,15**	**0,001**
n strains≥3	25	1507	0,06	29,4%	0,085	**-0,25**	**-0,47**	**-0,03**	**0,029**	30	1706	**0.71**	**93,6%**	**<0,001**	**-0,50**	**-0,87**	**-0,13**	**<0,001**

	BW(kg)									BMI (kg/m^2)								
	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P
B. bif.	15	891	0,07	27,9%	0,150	**-0,90**	**-1,17**	**-0.63**	**<0.001**	15	914	**0,13**	**79,1%**	**<0,001**	-0,11	-0,35	0,14	0,403
B. brev.	8	462	0,30	31,9%	0,173	-0,76	-1,53	0,01	0,055	14	702	**1,38**	**92,4%**	**<0,001**	**-0,75**	**-1,45**	**-0,04**	**0,039**
B. lac.	17	1208	0,00	0,0%	0,727	**-0,32**	**-0,46**	**-0,18**	**<0,001**	16	945	**0,59**	**84,3%**	**<0,001**	-0,51	-1,04	0,02	0,058
B. lon.	10	565	0,00	0,0%	0,842	**-1,20**	**-1,70**	**-0,70**	**<0,001**	16	889	**2,00**	**94,7%**	**<0,001**	**-0,86**	**-1,67**	**-0,05**	**0,037**
S. ther.	11	589	0,03	20,6%	0,247	**-0,40**	**-0,67**	**-0,13**	**0,004**	16	810	**2,31**	**95,9%**	**<0,001**	**-0,86**	**-1,70**	**-0,03**	**0,043**
Lc. lac.	2	121	0,00	0,0%	0,887	-0,41	-5,00	4,18	0,860	3	201	0,00	0,0%	0,840	0,34	-0,59	1,28	0,474
L. hel.	2	113	0,00	0,0%	0,945	**-0,20**	**-0,36**	**-0,04**	**0,017**	6	204	**2,46**	**91,5%**	**<0,001**	-0,72	-2,36	0,91	0,385
L. acid.	31	1802	0,02	14,3%	0,242	**-0,22**	**-0,39**	**-0,05**	**0,010**	33	1839	**0,36**	**86,5%**	**<0,001**	**-0,36**	**-0,63**	**-0,08**	**0,013**
L. del.	10	606	0,05	9,3%	0,357	**-0,83**	**-1,25**	**-0,41**	**<0,001**	14	794	**2,46**	**95,2%**	**<0,001**	**-0,97**	**-1,93**	**-0,02**	**0,046**
L. gas.	3	189	**0,87**	**87,8%**	**<0,001**	-0,69	-1,84	0,46	0,240	4	328	**0,07**	**84,4%**	**<0,001**	-0,26	-0,56	0,04	0,086
L. reut.	3	90	0,00	0,0%	0,999	-1,17	-2,43	0,09	0,070	2	69	0,00	0,0%	0,962	-0,37	-0,86	0,13	0,145
L. fer.	4	208	0,00	0,0%	0,985	-0,29	-0,90	0,32	0,350	3	180	0,00	0,0%	0,969	-0,11	-0,34	0,12	0,338
L. rham.	8	467	0,00	0,0%	0,518	**-0,93**	**-1,61**	**-0,25**	**0,008**	12	670	**3,23**	**96,1%**	**<0,001**	-0,86	-1,97	0,24	0,125
L. cas. gr.	25	1483	**0,12**	**37,7%**	**0,031**	-0,27	-0,56	0,01	0,059	33	1867	**0,69**	**93,1%**	**<0,001**	**-0,46**	**-0,81**	**-0,12**	**0,009**
L. cur.										2	187	0,00	0,0%	0,619	**-0,37**	**-0,59**	**-0,15**	**0,001**
L. sal.	2	178	0,00	0,0%	0,953	-0,59	-5,44	4,25	0,811	3	208	0,00	0,0%	0,922	0,12	-0,83	1,06	0,812
L. plan.	7	355	0,11	32,0%	0,184	**-0,56**	**-1,04**	**-0,08**	**0,022**	14	824	**0,37**	**79,8%**	**<0,001**	-0,32	-0,78	0,14	0,171

Heading: RCT, number of trials; n, number of subjects; τ^2, between-study variance; I^2, heterogeneity measure; P(het), P value of heterogeneity test relating on I^2 measure; E, estimate; lb, lower boundary of 95% confidence interval; ub, upper boundary of confidence interval; P value of Wald test.

Outcome: BW, Body weight; BMI, Body mass index.

Population: NW, normal weight; OW, overweight; OB, obese; IFG, impaired fasting glucose; T2DM, type 2 diabetes mellitus; GDM, gestational diabetes; NAFLD, nonalcoholic fatty liver disease.

Food form: FM & Y, fermented milk or yogurt.

Species: *B. bif., Bifidobacterium bifidum; B. brev., Bifidobacterium breve; B. lac., Bifidobacterium animalis* subsp. *lactis; B. lon., Bifidobacterium longum; S. ther., Streptococcus salivarius* subsp. *thermophilus; Lc. lac., Lactococcus lactis;. L. hel., Lactobacillus helveticus; L. acid., Lactobacillus acidophilus; L. del., Lactobacillus delbrueckii; L. gas., Lactobacillus gasseri; L. reut., Lactobacillus reuteri; L. fer., Lactobacillus fermentum; L. rham., Lactobacillus rhamnosus; L. cas. gr., Lactobacillus casei or paracasei; L. cur., Lactobacillus curvatus; L. sal., Lactobacillus salivarius; L. plan., Lactobacillus plantarum.*

Supplementary Table 5. Effect of probiotics on waist circumference and body fat mass. Subgroup analysis by study quality, study populations, daily dose (in CFU), food form, number of strains, species and subspecies.

	WC (cm)									BFM (kg)								
	RCT	n	τ^2	I²	P(het)	E	lb	ub	P	RCT	n	τ^2	I²	P(het)	E	lb	ub	P
All studies	26	1583	0,43	**35,6%**	**0,039**	**-1,01**	**-1,55**	**-0,48**	**<0,001**	27	1562	0,15	16,3%	0,230	**-0,62**	**-0,91**	**-0,34**	**<0,001**
Excl. low quality studies	22	1432	0,00	0,0%	0,732	**-1,47**	**-1,80**	**-1,14**	**<0,001**	22	1323	0,15	31,0%	0,079	**-0,59**	**-0,93**	**-0,25**	**0,001**
Excl. low/medium quality studies	17	1150	0,00	0,0%	0,631	**-1,45**	**-1,80**	**-1,11**	**<0,001**	**16**	**1032**	**0,27**	**45,1%**	**0,023**	**-0,46**	**-0,91**	**0,00**	**0,048**
Excl. studies with children	22	1344	**0,41**	**37,3%**	**0,041**	**-1,07**	**-1,63**	**-0,52**	**<0,001**	25	1443	0,09	19,2%	0,191	**-0,65**	**-0,95**	**-0,35**	**<0,001**
Excl. studies with pregnant women	26	1583	**0,43**	**35,6%**	**0,039**	**-1,01**	**-1,55**	**-0,48**	**<0,001**	27	1562	0,08	16,3%	0,223	**-0,62**	**-0,91**	**0,34**	**<0,001**
Excl. studies with gastric bypass	25	1537	**0,40**	**34,7%**	**0,046**	**-0,98**	**-1,51**	**-0,45**	**<0,001**	27	1562	0,08	16,3%	0,223	**-0,62**	**-0,91**	**0,34**	**<0,001**
Excl. studies from Iran	16	1016	**0,73**	**55,4%**	**0,004**	**-0,79**	**-1,52**	**-0,07**	**0,033**	24	1382	0,12	24,9%	0,129	**-0,60**	**-0,92**	**-0,28**	**0,001**
NW										3	103	0,00	0,0%	0,992	-1,11	-3,41	1,20	0,347
OW	13	771	0,16	26,2%	0,180	**-1,31**	**-1,79**	**-0,83**	**<0,001**	11	784	0,00	0,0%	0,968	**-0,96**	**-1,21**	**-0,71**	**<0,001**
OB	12	772	0,00	0,0%	0,630	-0,77	-2,05	0,52	0,243	14	696	0,00	0,0%	0,989	0,38	-0,09	0,85	0,111
IFG	5	203	0,00	0,0%	0,557	**-2,24**	**-3,55**	**-0,94**	**0,001**	5	271	0,00	0,0%	0,757	**-0,71**	**-1,22**	**-0,20**	**0,006**
T2DM	4	150	0,00	0,0%	0,841	-1,21	-2,51	-0,10	0,069	3	113	0,00	0,0%	0,989	-0,47	-2,51	1,57	0,650
NAFLD	4	246	0,00	0,0%	0,659	**-1,81**	**-3,20**	**-0,43**	**0,010**	3	168	0,00	0,0%	0,979	-0,86	-2,15	0,43	0,191
Dose > 10^8 & ≤ 10^9										2	121	0,00	0,0%	0,841	-0,54	-6,11	5,02	0,848
Dose > 10^9 & ≤ 10^{10}	9	471	0,00	0,0%	0,857	**-1,60**	**-2,53**	**-0,68**	**0,001**	4	176	0,00	0,0%	0,996	-0,84	-2,23	0,56	0,239
Dose > 10^{10} & ≤ 10^{11}	11	828	0,23	18,1%	0,272	**-0,92**	**-1,63**	**-0,21**	**0,011**	15	950	0,00	0,0%	0,898	**-0,92**	**-1,21**	**-0,63**	**<0,001**
Dose > 10^{11} & ≤ 10^{12}	4	187	**2,72**	**85,2%**	**<0,001**	-0,30	-2,19	1,59	0,754	6	315	**0,53**	**71,3%**	**0,004**	-0,29	-1,07	0,49	0,463
Pill	14	741	0,78	35,7%	0,090	**-1,15**	**-1,99**	**-0,30**	**0,008**	16	833	0,00	0,0%	1,000	**-0,84**	**-1,21**	**-0,49**	**<0,001**
FM & Y	10	633	0,45	46,4%	0,052	-0,78	-1,60	0,05	0,065	8	480	**0,59**	**74,7%**	**<0,001**	-0,33	-1,08	0,41	0,380
1 species	13	863	**0,42**	**44,7%**	**0,041**	**-1,16**	**-1,82**	**-0,51**	**0,001**	15	1021	0,00	0,0%	0,998	**-0,95**	**-1,22**	**-0,67**	**<0,001**
2 species	3	207	0,00	0,0%	0,996	-0,45	-2,43	1,52	0,655	5	221	**0,70**	**72,6%**	**0,006**	-0,02	-1,03	0,99	0,967
3 or more species	10	513	1,18	37,0%	0,113	-0,82	-2,06	0,43	0,198	7	320	0,00	0,0%	0,986	-0,78	-1,67	0,11	0,086

	WC (cm)									BFM (kg)								
	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P
B. bif.	2	107	0,00	0,0%	0,743	-1,19	-5,13	2,75	0,553	3	125	0,00	0,0%	0,992	-1,01	-3,57	1,55	0,439
B. brev.	6	267	**2,44**	**64,5%**	**0,015**	-0,83	-2,57	0,90	0,347	5	239	0,00	0,0%	0,946	-0,73	-1,63	0,16	0,109
B. lac.	11	673	0,00	0,0%	0,711	-0,06	-0,93	0,82	0,895	8	429	0,00	0,00%	0,993	-0,75	-1,71	0,21	0,126
B. lon.	5	248	**1,89**	**62,2%**	**0,032**	-1,27	-2,95	0,40	0,135	5	258	0,00	0,00%	1,000	-0,89	-1,81	0,03	0,058
S. ther.	7	356	**1,98**	**57,4%**	**0,029**	-0,78	-2,30	0,75	0,318	6	221	0,10	16,20%	0,310	0,19	-0,41	0,78	0,545
L. hel.	2	60	0,00	0,0%	0,574	3,03	-0,88	6,94	0,129									
L. acid.	12	625	0,69	23,1%	0,216	-0,77	-1,84	0,29	0,154	9	390	0,00	0,00%	0,877	-0,32	-1,02	0,38	0,370
L. del.	5	301	0,00	0,0%	0,535	**-1,90**	**-3,05**	**-0,75**	**0,001**	4	190	0,00	0,00%	0,995	-0,90	-2,20	0,39	0,172
L. gas.	4	328	**0,89**	**83,6%**	**<0,001**	**-1,10**	**-2,18**	**-0,02**	**0,046**	3	288	0,00	0,00%	0,765	**-1,11**	**-1,44**	**-0,78**	**<0.001**
L. reut.										2	50	0,00	0,00%	0,670	-0,80	-4,82	3,23	0,698
L. rham.	6	312	1,54	52,8%	0,060	-1,20	-2,71	0,32	0,122	5	297	0,37	38,00%	0,168	-0,21	-1,10	0,69	0,652
L. cas. gr.	8	364	0,29	12,9%	0,329	**-1,53**	**-2,57**	**-0,50**	**0,004**	7	384	0,00	0,00%	0,971	-0,46	-1,24	0,32	0,245
L. plan.	4	174	0,00	0,0%	0,447	0,32	-0,66	1,31	0,519	4	190	0,00	0,00%	0,830	**-0,90**	**-1,44**	**-0,36**	**0,001**

Heading: RCT, number of trials; n, number of subjects; τ^2, between-study variance; I^2, heterogeneity measure; P(het), P value of heterogeneity test relating on I^2 measure; E, estimate; lb, lower boundary of 95% confidence interval; ub, upper boundary of confidence interval; P value of Wald test.

Outcome: WC, Waist circumference; BFM, Body fat mass.

Population: NW, normal weight; OW, overweight; OB, obese; IFG, impaired fasting glucose; T2DM, type 2 diabetes mellitus; NAFLD, nonalcoholic fatty liver disease.

Food form: FM & Y, fermented milk or yogurt.

Species: *B. bif., Bifidobacterium bifidum; B. brev., Bifidobacterium breve; B. lac., Bifidobacterium animalis* subsp. *lactis; B. lon., Bifidobacterium longum; S. ther., Streptococcus salivarius* subsp. *thermophilus; L. hel., Lactobacillus helveticus; L. acid., Lactobacillus acidophilus; L. del., Lactobacillus delbrueckii; L. gas., Lactobacillus gasseri; L. reut., Lactobacillus reuteri; L. rham., Lactobacillus rhamnosus; L. cas. gr., Lactobacillus casei or paracasei; L. plan., Lactobacillus plantarum.*

Supplementary Table 6. Effect of probiotics on visceral and subcutaneous adipose tissues. Subgroup analysis by study quality, study populations, daily dose (in CFU), food form, number of strains and species.

	VAT (cm²)									SAT (cm²)								
	RCT	n	τ^2	I²	P(het)	E	lb	ub	P	RCT	n	τ^2	I²	P(het)	E	lb	ub	P
All studies	5	543	0,00	0,0%	0,538	**-6,30**	**-9,05**	**-3,56**	**<0,001**	5	543	0,00	0,0%	0,620	**-4,99**	**-7,55**	**-2,44**	**<0,001**
Excl. low quality studies	5	543	0,00	0,0%	0,538	**-6,30**	**-9,05**	**-3,56**	**<0,001**	3	386	0,00	14,8%	0,309	**-4,48**	**-8,00**	**-0,95**	**0,013**
Excl. low/medium quality studies	3	386	0,00	0,0%	0,789	**-7,48**	**-10,67**	**-4,29**	**<0,001**	4	405	**1,53**	**70,4%**	**0,017**	-2,70	-6,47	1,07	0,160
Excl. studies with children	5	543	0,00	0,0%	0,538	**-6,30**	**-9,05**	**-3,56**	**<0,001**	5	543	0,00	0,0%	0,620	**-4,99**	**-7,55**	**-2,44**	**<0.001**
Excl. studies with pregnant women	5	543	0,00	0,0%	0,538	**-6,30**	**-9,05**	**-3,56**	**<0,001**	5	543	0,00	0,0%	0,620	**-4,99**	**-7,55**	**-2,44**	**<0.001**
Excl. studies with gastric bypass	5	543	0,00	0,0%	0,538	**-6,30**	**-9,05**	**-3,56**	**<0,001**	5	543	0,00	0,0%	0,620	**-4,99**	**-7,55**	**-2,44**	**<0.001**
Excl. studies from Iran	5	543	0,00	0,0%	0,538	**-6,30**	**-9,05**	**-3,56**	**<0,001**	5	543	0,00	0,0%	0,620	**-4,99**	**-7,55**	**-2,44**	**<0.001**
OW	5	543	0,00	0,0%	0,538	**-6,30**	**-9,05**	**-3,56**	**<0,001**	5	543	0,00	0,0%	0,620	**-4,99**	**-7,55**	**-2,44**	**<0,001**
Dose > 10^{10} & ≤ 10^{11}	4	456	0,13	1,3%	0,386	**-6,12**	**-9,15**	**-3,10**	**<0,001**	4	456	0,00	0,0%	0,517	**-4,44**	**-7,57**	**-1,32**	**0,005**
Pill	2	157	0,00	0,0%	0,409	-2,95	-8,34	2,45	0,284	2	157	0,00	0,0%	0,835	**-5,86**	**-10,13**	**-1,59**	**0,007**
FM & Y	3	386	0,00	0,0%	0,789	**-7,48**	**-10,67**	**-4,29**	**<0,001**	3	386	1,53	14,8%	0,309	**-4,48**	**-8,00**	**-0,95**	**0,013**
n strains=1	4	448	0,00	0,0%	0,420	**-6,64**	**-9,65**	**-3,64**	**<0,001**	4	448	0,00	0,0%	0,503	**-4,50**	**-7,63**	**-1,36**	**0,005**
L. gas.	3	288	5,46	29,0%	0,244	**-6,37**	**-11,25**	**-1,50**	**0,010**	3	288	0,00	0,0%	0,961	**-6,16**	**-9,97**	**-2,35**	**0,002**

Heading: RCT, number of trials; n, number of subjects; τ^2, between-study variance; I², heterogeneity measure; P(het), P value of heterogeneity test relating on I² measure; E, estimate; lb, lower boundary of 95% confidence interval; ub, upper boundary of confidence interval; P value of Wald test.

Outcome: VAT, visceral adipose tissue; SAT, subcutaneous adipose tissue.

Population: OW, overweight.

Food form: FM & Y, fermented milk or yogurt.

Species: *L. gas., Lactobacillus gasseri.*

Supplementary Table 7. Effect of probiotics on fasting glucose and glycated haemoglobin. Subgroup analysis by study quality, study populations, daily dose (in CFU), food form, number of strains, species and subspecies.

	FG (mmol/l))									HbA_{1c} (%)								
	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P
All studies	83	5188	**0,02**	**55,4%**	**<0,001**	**-0,12**	**-0,18**	**-0,07**	**<0,001**	28	1796	**0,03**	**81,3%**	**<0,001**	**-0,14**	**-0,22**	**-0,06**	**<0,001**
Excl. low quality studies	68	4416	**0,03**	**61,7%**	**<0,001**	**-0,14**	**-0,20**	**-0,08**	**<0,001**	25	1667	**0,02**	**75,1%**	**<0,001**	**-0,17**	**-0,26**	**-0,90**	**<0,001**
Excl. low/medium quality studies	56	3611	**0,03**	**64,7%**	**<0,001**	**-0,14**	**-0,21**	**-0,07**	**<0,001**	20	1438	**0,02**	**76,2%**	**<0,001**	**-0,19**	**-0,27**	**-0,10**	**<0,001**
Excl. studies with children	81	5032	**0,03**	**56,5%**	**<0,001**	**-0,13**	**-0,18**	**-0,07**	**<0,001**	28	1796	**0,03**	**81,3%**	**<0,001**	**-0,14**	**-0,22**	**-0,06**	**0,001**
Excl. studies with pregnant women	71	4103	**0,02**	**51,0%**	**<0,001**	**-0,12**	**-0,18**	**-0,06**	**<0,001**	26	1553	**0,04**	**81,6%**	**<0,001**	**-0,15**	**-0,25**	**-0,06**	**0,002**
Excl. studies with gastric bypass	81	5062	**0,02**	**56,5%**	**<0,001**	**-0,12**	**-0,18**	**-0,07**	**<0,001**	27	1716	**0,03**	**82,0%**	**<0,001**	**-0,14**	**-0,23**	**-0,06**	**0,001**
Excl. studies from Iran	48	3178	0,00	19,4%	0,125	-0,04	-0,09	0,00	0,062	18	1209	**0,03**	**83,1%**	**<0,001**	-0,08	-0,17	0,01	0,095
NW	16	660	0,00	8,0%	0,362	**-0,12**	**-0,20**	**-0,04**	**0,004**	3	129	0,00	0,0%	0,616	**0,10**	**0,04**	**0,16**	**0,001**
OW	32	1994	**0,04**	**61,2%**	**<0,001**	**-0,22**	**-0,34**	**-0,10**	**<0,001**	14	851	**0,03**	**72,1%**	**<0,001**	**-0,18**	**-0,31**	**-0,05**	**0,007**
OB	23	1449	0,01	27,6%	0,110	0,01	-0,07	0,09	0,829	9	573	0,01	39,4%	0,105	**-0,24**	**-0,33**	**-0,15**	**<0,001**
IFG	18	868	**0,06**	**73,3%**	**<0,001**	-0,09	-0,23	0,06	0,257	6	439	**0,03**	**89,7%**	**<0,001**	**-0,15**	**-0,31**	**0,00**	**0,048**
T2DM	19	1103	0,15	27,7%	0,127	**-0,66**	**-1,00**	**-0,31**	**<0,001**	13	713	**0,05**	**54,1%**	**0,010**	**-0,28**	**-0,46**	**-0,11**	**0,002**
GDM	7	475	**0,06**	**84,6%**	**<0,001**	-0,18	-0,39	0,02	0,073									
NAFLD	12	660	**0,09**	**68,5%**	**<0,001**	**-0,30**	**-0,52**	**-0,08**	**0,008**	2	122	0,00	0,0%	0,541	-0,17	-0,39	0,06	0,150
Dose $> 10^{7}$ & $\leq 10^{8}$	2	76	0,00	0,0%	0,906	-0,14	-0,41	0,13	0,311									
Dose $> 10^{8}$ & $\leq 10^{9}$	7	466	0,00	0,0%	0,662	-0,05	-0,15	0,05	0,296									
Dose $> 10^{9}$ & $\leq 10^{10}$	35	2080	**0,05**	**70,7%**	**<0,001**	**-0,18**	**-0,28**	**-0,09**	**<0,001**	10	590	**0,01**	**53,5%**	**0,022**	**-0,26**	**-0,37**	**-0,16**	**<0,001**
Dose $> 10^{10}$ & $\leq 10^{11}$	24	1874	0,00	4,6%	0,397	-0,04	-0,10	0,02	0,154	11	755	0,01	35,5%	0,114	-0,03	-0,13	0,07	0,514
Dose $> 10^{11}$ & $\leq 10^{12}$	10	442	**0,03**	**69,9%**	**<0,001**	-0,12	-0,28	0,03	0,128	5	340	**0,01**	**85,1%**	**<0,001**	-0,02	-0,14	0,10	0,769
Pill	50	3298	**0,04**	**65,8%**	**<0,001**	**-0,18**	**-0,25**	**-0,10**	**<0,001**	16	1057	**0,02**	**74,0%**	**<0,001**	**-0,15**	**-0,25**	**-0,05**	**0,003**
FM & Y	22	1190	0,01	23,7%	0,155	-0,04	-0,12	0,03	0,247	12	739	**0,04**	**86,6%**	**<0,001**	-0,14	-0,29	0,01	0,057
1 species	31	2054	0,00	0,0%	0,534	-0,01	-0,05	0,03	0,747	10	553	0,00	19,6%	0,263	0,04	-0,01	0,09	0,143
2 species	17	1228	0,01	37,7%	0,059	-0,06	-0,15	0,03	0,216	8	572	**0,03**	**84,4%**	**<0,001**	**-0,23**	**-0,39**	**-0,07**	**0,005**
3 or more species	35	1906	**0,05**	**71,3%**	**<0,001**	**-0,27**	**-0,38**	**-0,16**	**<0,001**	10	671	**0,01**	**56,9%**	**0,013**	**-0,14**	**-0,22**	**-0,06**	**<0,001**

	FG (mmol/l))									HbA$_{1c}$ (%)								
	RCT	n	τ^2	I²	P(het)	E	lb	ub	P	RCT	n	τ^2	I²	P(het)	E	lb	ub	P
B. bif.	13	846	**0,02**	**51,4%**	**0,016**	**-0,22**	**-0,35**	**-0,09**	**0,001**	4	284	0,01	37,2%	0,189	**-0,19**	**-0,36**	**-0,02**	**0,027**
B. brev.	18	915	**0,10**	**79,8%**	**<0,001**	**-0,34**	**-0,53**	**-0,15**	**0,001**	6	362	0,02	43,1%	0,118	**-0,26**	**-0,42**	**-0,10**	**0,001**
B. lac.	24	1768	**0,02**	**56,1%**	**<0,001**	-0,04	-0,12	0,04	0,298	12	917	**0,02**	**78,2%**	**<0,001**	**-0,21**	**-0,33**	**-0,10**	**<0,001**
B. lon.	18	981	**0,07**	**65,8%**	**<0,001**	**-0,30**	**-0,47**	**-0,13**	**<0,001**	6	367	**0,03**	**59,5%**	**0,030**	**-0,22**	**-0,41**	**-0,03**	**0,025**
S. ther.	23	1091	**0,07**	**76,1%**	**<0,001**	**-0,28**	**-0,42**	**-0,14**	**<0,001**	7	427	**0,02**	**58,2%**	**0,026**	**-0,18**	**-0,32**	**-0,04**	**0,010**
Lc. lac.	3	193	0,00	0,0%	0,437	-0,17	-0,61	0,27	0,453	2	123	0,00	0,0%	0,691	-0,06	-0,28	0,16	0,611
L. hel.	4	163	**0,24**	**84,1%**	**<0,001**	-0,35	-0,93	0,23	0,238	2	113	0,00	0,0%	0,722	**-0,18**	**-0,27**	**-0,09**	**<0,001**
L. acid.	42	2435	**0,05**	**70,1%**	**<0,001**	**-0,23**	**-0,33**	**-0,13**	**<0,001**	16	1052	0,01	51,8%	0,008	**-0,27**	**-0,35**	**-0,19**	**<0,001**
L. del.	20	988	**0,05**	**64,9%**	**<0,001**	**-0,31**	**-0,46**	**-0,16**	**<0,001**	6	376	**0,03**	**64,6%**	**0,015**	**-0,20**	**-0,39**	**-0,01**	**0,041**
L. gas.	3	189	0,00	0,0%	0,798	0,06	-0,14	0,26	0,581	3	189	0,00	0,0%	0,586	**0,10**	**0,05**	**0,15**	**<0,001**
L. fer.	3	180	**0,27**	**68,7%**	**0,041**	-0,37	-1,08	0,34	0,318									
L. rham.	20	1271	**0,04**	**64,0%**	**<0,001**	**-0,26**	**-0,39**	**-0,13**	**<0,001**	5	417	**0,06**	**79,4%**	**0,001**	-0,23	-0,50	0,04	0,088
L. cas. gr.	37	2068	**0,05**	**71,8%**	**<0,001**	**-0,25**	**-0,36**	**-0,14**	**<0,001**	12	791	**0,02**	**65,3%**	**<0,001**	**-0,20**	**-0,32**	**-0,08**	**0,001**
L. cur.	2	187	0,00	0,0%	0,472	-0,08	-0,25	0,09	0,359									
L. sal.	5	446	0,00	0,0%	0,468	-0,01	-0,11	0,09	0,797									
L. plan.	13	815	**0,02**	**54,5%**	**0,009**	-0,12	-0,26	0,02	0,080	2	152	0,00	0,0%	0,623	**-0,17**	**-0,26**	**-0,09**	**<0,001**

Heading: RCT, number of trials; n, number of subjects; τ^2, between-study variance; I², heterogeneity measure; P(het), P value of heterogeneity test relating on I² measure; E, estimate; lb, lower boundary of 95% confidence interval; ub, upper boundary of confidence interval; P value of Wald test.

Outcome: FG, Fasting glucose; HbA$_{1c}$, glycated haemoglobin.

Populations: NW, normal weight; OW, overweight; OB, obese; IFG, impaired fasting glucose; T2DM, type 2 diabetes mellitus; GDM, gestational diabetes; NAFLD, nonalcoholic fatty liver disease.

Food form: FM & Y, fermented milk or yogurt.

Species: *B. bif., Bifidobacterium bifidum; B. brev., Bifidobacterium breve; B. lac., Bifidobacterium animalis* subsp. *lactis; B. lon., Bifidobacterium longum; S. ther., Streptococcus salivarius* subsp. *thermophilus; Lc. lac., Lactococcus lactis;. L. hel., Lactobacillus helveticus; L. acid., Lactobacillus acidophilus; L. del., Lactobacillus delbrueckii; L. gas., Lactobacillus gasseri; L. fer., Lactobacillus fermentum; L. rham., Lactobacillus rhamnosus; L. cas. gr., Lactobacillus casei or paracasei; L. cur., Lactobacillus curvatus; L. sal., Lactobacillus salivarius; L. plan., Lactobacillus plantarum.*

Supplementary Table 8. Effect of probiotics on insulin and homeostatic model of insulin resistance. Subgroup analysis by study quality, study populations, daily dose (in CFU), food form, number of strains, species and subspecies.

	INS (mU/l)									**HOMA-IR**								
	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P
All studies	63	3854	**0,26**	**72,8%**	**<0,001**	**-0,80**	**-1,08**	**-0,52**	**<0,001**	52	3513	**0,15**	**74,9%**	**<0,001**	**-0,27**	**-0,41**	**-0,12**	**<0,001**
Excl. low quality studies	52	3282	**0,27**	**76,8%**	**<0,001**	**-0,85**	**-1,14**	**-0,55**	**<0,001**	44	3091	**0,15**	**76,8%**	**<0,001**	**-0,31**	**-0,46**	**-0,15**	**<0,001**
Excl. low/medium quality studies	46	2915	**0,79**	**73,9%**	**<0,001**	**-1,04**	**-1,44**	**-0,64**	**<0,001**	41	2925	**0,10**	**70,3%**	**<0,001**	**-0,31**	**-0,45**	**-0,17**	**<0,001**
Excl. studies with children	62	3754	**0,26**	**73,2%**	**<0,001**	**-0,81**	**-1,10**	**-0,53**	**<0,001**	50	3369	**0,15**	**75,6%**	**<0,001**	**-0,28**	**-0,43**	**-0,13**	**<0,001**
Excl. studies with pregnant women	53	3000	**0,14**	**61,8%**	**<0,001**	**-0,50**	**-0,76**	**-0,23**	**<0,001**	42	2548	**0,15**	**73,2%**	**<0,001**	**-0,20**	**0,37**	**-0,03**	**0,019**
Excl. studies with gastric bypass	62	3808	**0,26**	**73,2%**	**<0,001**	**-0,81**	**-1,09**	**-0,52**	**<0,001**	50	3387	**0,15**	**75,8%**	**<0,001**	**-0,27**	**-0,41**	**-0,12**	**<0,001**
Excl. studies from Iran	37	2373	**0,60**	**54,2%**	**<0,001**	-0,36	-0,80	0,09	0,117	29	2162	**0,17**	**74,2%**	**<0,001**	-0,12	-0,32	0,08	0,231
NW	11	390	0,34	28,2%	0,176	0,11	-0,57	0,79	0,744	6	325	**0,23**	**78,2%**	**<0,001**	0,27	-0,19	0,73	0,247
OW	22	1310	**0,56**	**77,9%**	**<0,001**	**-1,20**	**-1,78**	**-0,61**	**<0,001**	16	936	**0,11**	**42,7%**	**0,036**	**-0,69**	**-0,99**	**-0,40**	**<0,001**
OB	20	1300	0,17	21,6%	0,187	-0,39	-0,84	0,07	0,094	20	1287	**0,06**	**56,6%**	**0,001**	-0,09	-0,27	0,08	0,280
IFG	17	828	0,00	0,0%	0,474	**-0,77**	**-1,01**	**-0,52**	**<0,001**	13	683	0,01	16,4%	0,278	0,03	-0,13	0,19	0,731
T2DM	13	795	1,29	37,8%	0,081	**-1,66**	**-2,70**	**-0,61**	**0,002**	10	651	0,09	18,2%	0,275	**-1,05**	**-1,48**	**-0,61**	**<0,001**
GDM	6	415	**2,88**	**73,8%**	**0,002**	**-3,17**	**-4,88**	**-1,46**	**<0,001**	6	415	**0,10**	**66,4%**	**0,011**	**-0,71**	**-1,05**	**-0,36**	**<0,001**
NAFLD	8	362	**0,28**	**79,7%**	**<0,001**	-0,56	-1,16	0,05	0,070	9	456	**0,32**	**83,7%**	**<0,001**	-0,15	-0,64	0,34	0,552
Dose > 10^8 & ≤ 10^9	5	335	0,00	0,0%	0,630	-1,21	-2,48	0,05	0,060	4	242	0,00	0,0%	0,999	**-0,29**	**-0,38**	**-0,21**	**<0,001**
Dose > 10^9 & ≤ 10^{10}	28	1671	**0,72**	**77,5%**	**<0,001**	**-0,92**	**-1,42**	**-0,41**	**<0,001**	24	1524	**0.30**	**80,8%**	**0,001**	**-0,28**	**-0,55**	**-0,01**	**0,041**
Dose > 10^{10} & ≤ 10^{11}	17	1265	**1,01**	**54,7%**	**0,004**	-0,92	-1,72	-0,11	0,026	15	1279	**0,13**	**60,1%**	**0,005**	-0,19	-0,46	0,09	0,182
Dose > 10^{11} & ≤ 10^{12}	9	402	**1,88**	**70,4%**	**0,001**	-0,98	-2,19	0,22	0,109	5	287	**0,17**	**72,7%**	**0,009**	**-0,51**	**-0,99**	**-0,03**	**0,036**
Pill	39	2509	**0,97**	**81,2%**	**<0,001**	**-1,49**	**-2,00**	**-0,99**	**<0,001**	35	2380	**0,17**	**78,8%**	**<0,001**	**-0,37**	**-0,56**	**-0,18**	**<0,001**
FM & Y	17	949	0,00	0,0%	0,483	-0,08	-0,20	0,05	0,236	12	750	**0,10**	**55,2%**	**0,011**	-0,04	-0,30	0,22	0,751
1 species	25	1626	0,08	4,6%	0,397	**-0,62**	**-1,14**	**-0,10**	**0,019**	17	1007	0,01	14,2%	0,287	0,02	-0,13	0,18	0,768
2 species	13	962	**0,09**	**77,2%**	**<0,001**	-0,30	-0,63	0,03	0,078	12	978	**0,15**	**75,0%**	**<0,001**	-0,18	-0,45	0,10	0,212
3 or more species	25	1266	**1,39**	**68,1%**	**<0,001**	**-1,72**	**-2,40**	**-1,04**	**<0,001**	23	1328	**0,21**	**80,1%**	**<0,001**	**-0,62**	**-0,89**	**-0,35**	**<0,001**

	INS (mU/l)									HOMA-IR								
	RCT	n	τ^2	I²	P(het)	E	lb	ub	P	RCT	n	τ^2	I²	P(het)	E	lb	ub	P
B. bif.	10	646	0,32	17,2%	0,285	**-3,27**	**-4,12**	**-2,42**	**<0,001**	11	726	0,82	39,7%	0,084	**-0,91**	**-1,21**	**-0,61**	**<0,001**
B. brev.	12	530	**1,16**	**61,9%**	**0,002**	**-1,32**	**-2,27**	**-0,36**	**0,007**	11	560	**0,31**	**86,9%**	**<0,001**	-0,38	-0,82	0,06	0,094
B. lac.	20	1461	**0,92**	**64,5%**	**<0,001**	**-0,69**	**-1,31**	**-0,07**	**0,029**	20	1596	**0,18**	**76,4%**	**<0,001**	**-0,28**	**-0,51**	**-0,05**	**0,018**
B. lon.	10	501	0,47	40,3%	0,089	**-0,98**	**-1,76**	**-0,20**	**0,014**	10	551	**0,36**	**84,8%**	**<0,001**	-0,36	-0,84	0,13	0,153
S. ther.	15	611	**0,69**	**60,1%**	**0,001**	**-0,84**	**-1,48**	**-0,19**	**0,011**	13	673	**0,20**	**84,6%**	**<0,001**	-0,33	-0,66	<0,001	0,050
Lc. lac.										2	158	1,39	63,2%	0,099	-1,69	-3,74	0,37	0,108
L. hel.	4	163	**6,84**	**83,3%**	**<0,001**	-1,53	-4,41	1,34	0,296	4	187	0,04	25,5%	0,258	**-0,80**	**-1,15**	**-0,45**	**<0,001**
L. acid.	32	1830	**0,90**	**79,6%**	**<0,001**	**-1,39**	**-1,90**	**-0,87**	**<0,001**	31	1844	**0,17**	**79,4%**	**<0,001**	**-0,47**	**-0,66**	**-0,27**	**<0,001**
L. del.	14	624	0,33	38,2%	0,072	**-0,63**	**-1,21**	**-0,06**	**0,030**	11	582	**0,25**	**83,5%**	**<0,001**	-0,31	-0,71	0,08	0,119
L. gas.	3	189	0,00	0,0%	0,794	-1,35	-3,97	1,28	0,315									
L. fer.	2	120	0,00	0,0%	0,864	**-4,37**	**-6,13**	**-2,61**	**<0,001**	3	180	0,10	37,7%	0,201	**-0,68**	**-1,26**	**-0,09**	**0,023**
L. rham.	12	640	0,44	43,2%	0,055	-0,60	-1,28	0,09	0,090	10	756	**0,36**	**82,9%**	**<0,001**	-0,26	-0,76	0,23	0,293
L. cas. gr.	26	1360	**1,55**	**64,2%**	**<0,001**	**-1,97**	**-2,69**	**-1,24**	**<0,001**	24	1377	**0,24**	**81,8%**	**<0,001**	**-0,54**	**-0,81**	**-0,27**	**<0,001**
L. cur.	2	187	0,41	60,4%	0,112	0,35	-0,70	1,41	0,511									
L. sal.	5	446	0,55	27,7%	0,237	0,01	-1,22	1,23	0,992	5	446	**0,42**	**67,0%**	**0,016**	-0,20	-0,93	0,54	0,600
L. plan.	7	369	**2,33**	**83,6%**	**<0,001**	-1,28	-2,70	0,14	0,078	6	342	**0,38**	**83,2%**	**<0,001**	-0,47	-1,09	0,14	0,131

Heading: RCT, number of trials; n, number of subjects; τ^2, between-study variance; I², heterogeneity measure; P(het), P value of heterogeneity test relating on I² measure; E, estimate; lb, lower boundary of 95% confidence interval; ub, upper boundary of confidence interval; P value of Wald test.

Outcome: INS, insulin; HOMA-IR; homeostatic model of insulin resistance.

Population: NW, normal weight; OW, overweight; OB, obese; IFG, impaired fasting glucose; T2DM, type 2 diabetes mellitus; GDM, gestational diabetes; NAFLD, nonalcoholic fatty liver disease.

Food form: FM & Y, fermented milk or yogurt.

Species: *B. bif., Bifidobacterium bifidum; B. brev., Bifidobacterium breve; B. lac., Bifidobacterium animalis* subsp. *lactis; B. lon., Bifidobacterium longum; S. ther., Streptococcus salivarius* subsp. *thermophilus; Lc. lac., Lactococcus lactis;. L. hel., Lactobacillus helveticus; L. acid., Lactobacillus acidophilus; L. del., Lactobacillus delbrueckii; L. gas., Lactobacillus gasseri; L. reut., Lactobacillus reuteri; L. fer., Lactobacillus fermentum; L. rham., Lactobacillus rhamnosus; L. cas. gr., Lactobacillus casei or paracasei; L. cur., Lactobacillus curvatus; L. sal., Lactobacillus salivarius; L. plan., Lactobacillus plantarum.*

Supplementary Table 9. Effect of probiotics on C-reactive protein and triglycerides. Subgroup analysis by study quality, study populations, daily dose (in CFU), food form, species and subspecies.

	CRP (mg/l)									TG (mg/dl)								
	RCT	n	τ^2	I²	P(het)	E	lb	ub	P	RCT	n	τ^2	I²	P(het)	E	lb	ub	P
All studies	41	2376	**0,38**	**67,1%**	**<0,001**	**-0,48**	**-0,76**	**-0,21**	**0,001**	74	4461	**77,46**	**35,9%**	**0,002**	**-5,40**	**-9,17**	**-1,63**	**0,005**
Excl. low quality studies	34	2044	**0,41**	**69,0%**	**<0,001**	**-0,55**	**-0,85**	**-0,26**	**<0,001**	60	3749	**107,18**	**43,1%**	**<0,001**	**-6,52**	**-10,91**	**-2,13**	**0,004**
Excl. low/medium quality studies	25	1466	**0,65**	**72,3%**	**<0,001**	**-0,70**	**-1,12**	**-0,28**	**0,001**	49	2965	**109,64**	**43,5%**	**0,001**	**-6,65**	**-11,60**	**-1,71**	**0,008**
Excl. studies with children	40	2276	**0,38**	**67,7%**	**<0,001**	**-0,47**	**-0,75**	**-0,19**	**0,001**	70	4197	**88,33**	**38,8%**	**0,001**	**-5,79**	**-9,81**	**-1,77**	**0,005**
Excl. studies with pregnant women	36	1990	**0,16**	**47,0%**	**0,001**	**-0,29**	**-0,52**	**-0,06**	**0,012**	69	4033	36,67	21,0%	0,069	**-3,75**	**-7,18**	**-0,32**	**0,032**
Excl. studies with gastric bypass	39	2250	**0,38**	**68,0%**	**<0,001**	**-0,51**	**-0,79**	**-0,23**	**<0,001**	72	4335	**81,23**	**37,3%**	**0,001**	**-5,27**	**-9,12**	**-1,42**	**0,007**
Excl. studies from Iran	26	1568	0,10	40,6%	0,018	-0,10	-0,33	0,13	0,385	47	2878	1,88	1,2%	0,449	-0,26	-3,82	3,30	0,887
NW	11	442	0,00	0,0%	0,607	-0,03	-0,22	0,16	0,730	17	778	69,63	33,7%	0,087	-5,03	-12,29	2,23	0,174
OW	14	791	0,00	0,0%	0,515	**-0,42**	**-0,64**	**-0,20**	**<0,001**	28	1795	49,96	30,5%	0,065	-4,40	-9,75	0,96	0,108
OB	12	778	**1,19**	**72,2%**	**<0,001**	0,08	-0,73	0,88	0,852	24	1460	0,00	0,0%	0,508	-0,92	-6,60	4,77	0,752
IFG	6	249	**2,41**	**84,8%**	**<0,001**	0,36	-1,04	1,76	0,616	18	863	86,62	25,9%	0,152	-1,57	-10,51	7,37	0,731
T2DM	9	381	0,00	0,0%	0,885	**-0,52**	**-0,89**	**-0,15**	**0,006**	14	865	0,00	0,0%	0,609	**-9,05**	**-15,64**	**-2,46**	**0,007**
GDM	3	188	0,00	0,0%	0,403	**-1,88**	**-2,35**	**-1,42**	**<0,001**	3	230	241,21	58,6%	0,089	**-27,40**	**-50,39**	**-4,42**	**0,019**
NAFLD	3	212	0,74	46,8%	0,152	-0,41	-1,86	1,03	0,574	11	614	64,45	33,2%	0,133	**-12,89**	**-21,82**	**-3,97**	**0,005**
Dose > 10^{8} & ≤ 10^{9}	2	145	0,00	0,0%	0,817	-1,25	-2,53	0,04	0,057	2	76	178,31	0,0%	0,859	-6,46	-46,15	33,23	0,750
Dose > 10^{9} & ≤ 10^{10}	16	901	**0,43**	**63,6%**	**<0,001**	**-0,84**	**-1,32**	**-0,35**	**0,001**	6	414	108,07	52,7%	0,061	-4,84	-21,20	11,52	0,562
Dose > 10^{10} & ≤ 10^{11}	15	1081	**0,34**	**63,6%**	**<0,001**	-0,09	-0,50	0,32	0,665	29	1767	**62,27**	**48,6%**	**0,002**	**-10,47**	**-16,52**	**-4,43**	**0,001**
Dose > 10^{11} & ≤ 10^{12}	5	134	**0,98**	**88,3%**	**<0,001**	-0,67	-1,64	0,30	0,176	23	1602	0,00	28,3%	0,102	-0,91	-7,32	5,51	0,782
Pill, P	24	1445	**0,73**	**68,8%**	**<0,001**	**-0,71**	**-1,17**	**-0,25**	**0,003**	43	2679	**122,77**	**48,0%**	**<0,001**	**-9,61**	**-15,01**	**-4,22**	**<0,001**
FM, Y	9	324	0,00	0,0%	0,598	-0,07	-0,26	0,12	0,461	23	1216	0,00	0,0%	0,942	-0,40	-5,48	4,67	0,876
1 species	20	1313	**0,21**	**48,6%**	**0,008**	-0,10	-0,44	0,25	0,587	28	1934	0,00	0,0%	0,938	3,53	-1,14	8,19	0,139
2 species	4	247	0,00	0,0%	0,700	-0,21	-0,48	0,06	0,725	14	777	38,83	11,6%	0,326	-9,64	-19,33	0,04	0,051
3 or more species	17	816	**0,77**	**73,8%**	**<0,001**	-1,07	-1,62	-0,51	0,126	32	1750	**116,57**	**52,5%**	**<0,001**	**-10,94**	**-16,80**	**-5,08**	**<0,001**

	CRP (mg/l)									TG (mg/dl)								
	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P
B. brev.	9	478	**0,49**	**62,30%**	**0,007**	**-0,85**	**-1,49**	**-0,21**	**0,009**	14	724	99,10	31,00%	0,128	**-13,32**	**-23,04**	**-3,60**	**0,007**
B. lac.	9	528	0,24	47,8%	0,053	**-0,91**	**-1,41**	**-0,41**	**<0,001**	20	1319	0,00	0,0%	0,496	-0,40	-5,14	4,33	0,867
B. lon.	6	332	0,28	40,8%	0,133	-0,50	-1,20	0,20	0,161	16	882	47,26	25,1%	0,171	**-12,28**	**-19,61**	**-4,96**	**0,001**
S. ther.	12	522	**0,48**	**75,5%**	**<0,001**	**-0,64**	**-1,17**	**-0,10**	**0,020**	22	1006	67,16	32,3%	0,073	**-7,55**	**-14,35**	**-0,07**	**0,030**
Lc. lac.										4	236	440,36	47,0%	0,129	-6,04	-36,33	24,25	0,696
L. hel.	4	163	**0,45**	**68,0%**	**0,025**	**-1,04**	**-1,86**	**-0,22**	**0,013**	3	115	0,00	0,0%	0,471	1,19	-19,47	21,85	0,910
L. acid.	17	889	0,21	34,6%	0,080	**-1,24**	**-1,63**	**-0,84**	**<0,001**	38	2220	**92,43**	**40,2%**	**0,006**	**-10,71**	**-16,06**	**-5,36**	**<0,001**
L. del.	9	354	0,04	20,9%	0,257	-0,26	-0,58	0,07	0,121	18	893	**83,28**	**42,6%**	**0,029**	**-10,07**	**-17,35**	**-2,79**	**0,007**
L. gas.										3	189	0,00	0,0%	0,733	4,53	-13,98	23,03	0,632
L. reut.	2	50	0,00	0,0%	0,922	0,30	-0,75	1,34	0,580									
L. fer.	2	120	0,33	17,7%	0,270	**-1,64**	**-3,07**	**-0,21**	**0,025**	3	180	0,00	0,0%	0,405	**-8,84**	**-16,31**	**-1,37**	**0,020**
L. rham.	8	417	0,20	32,6%	0,168	-0,30	-0,88	0,29	0,317	18	922	88,47	38,4%	0,050	**-9,36**	**-17,13**	**-1,59**	**0,018**
L. cas. gr.	16	842	**1,51**	**79,3%**	**<0,001**	**-0,78**	**-1,51**	**-0,05**	**0,036**	32	1804	**109,20**	**46,5%**	**0,002**	**-12,66**	**-18,74**	**-6,58**	**<0,001**
L. cur.	2	187	0,00	0,0%	0,556	-0,10	-0,60	0,40	0,684	2	187	**703,04**	**75,3%**	**0,044**	-36,53	-78,57	5,50	0,088
L. sal.	3	268	0,00	0,0%	0,584	-0,72	-1,89	0,44	0,224	5	446	80,26	32,7%	0,203	-4,10	-18,05	9,84	0,564
L. plan.	10	703	**0,51**	**80,0%**	**<0,001**	-0,44	-1,02	0,13	0,128	13	600	124,22	28,8%	0,155	-6,50	-18,56	5,55	0,290

Heading: RCT, number of trials; n, number of subjects; τ^2, between-study variance; I^2, heterogeneity measure; P(het), P value of heterogeneity test relating on I^2 measure; E, estimate; lb, lower boundary of 95% confidence interval; ub, upper boundary of confidence interval; P value of Wald test.

Outcome: CRP, C-reactive protein; TG, triglycerides.

Populations: NW, normal weight; OW, overweigh; OB, obese; IFG, impaired fasting glucose; T2DM, type 2 diabetes mellitus; GDM, gestational diabetes; NAFLD, nonalcoholic fatty liver disease.

Food form: FM & Y, fermented milk or yogurt.

Species: *B. brev., Bifidobacterium breve; B. lac., Bifidobacterium animalis* subsp. *lactis; B. lon., Bifidobacterium longum; S. ther., Streptococcus salivarius* subsp. *thermophilus; Lc. lac., Lactococcus lactis;. L. hel., Lactobacillus helveticus; L. acid., Lactobacillus acidophilus; L. del., Lactobacillus delbrueckii; L. gas., Lactobacillus gasseri; L. reut., Lactobacillus reuteri; L. fer., Lactobacillus fermentum; L. rham., Lactobacillus rhamnosus; L. cas. gr., Lactobacillus casei or paracasei; L. cur., Lactobacillus curvatus; L. sal., Lactobacillus salivarius; L. plan., Lactobacillus plantarum.*

SI conversion factors: To convert CRP to nmol/L, multiply values by 9.524. To convert triglycerides to mmol/L, divide values by 88.57.

Supplementary Table 10. Effect of probiotics on alanine-, aspartate- and gamma-glutamyl- transferases. Subgroup analysis by study quality, study populations, daily dose (in CFU), food form, number of strains, species and subspecies.

	ALAT (U/l)									**ASAT (U/l)**								
	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P
All studies	26	1466	**52,47**	**92,9%**	**<0,001**	**-4,40**	**-7,58**	**-1,22**	**0,007**	23	1340	**63,43**	**96,8%**	**<0,001**	**-3,67**	**-7,25**	**-0,09**	**0,044**
Excl. low quality studies	23	1331	**41,41**	**87,9%**	**<0,001**	**-4,25**	**-7,36**	**-1,13**	**0,008**	20	1205	**49,17**	**92,7%**	**<0,001**	**-3,49**	**-6,96**	**-0,03**	**0,048**
Excl. low/medium quality studies	18	1091	**60,37**	**88,2%**	**<0,001**	-3,88	-7,93	0,17	0,061	16	1027	**62,43**	**92,0%**	**<0,001**	-2,87	-7,06	1,33	0,180
Excl. studies with children	23	1338	**55,09**	**93,7%**	**<0,001**	**-3,75**	**-7,17**	**-0,34**	**0,031**	22	1276	**63,91**	**97,0%**	**<0,001**	-2,64	-7,32	0,03	0,052
Excl. studies with pregnant women	26	1466	**0,00**	**92,9%**	**<0,001**	**-4,40**	**-7,58**	**-1,22**	**0,007**	23	1340	**63,43**	**96,8%**	**<0,001**	**-3,67**	**-7,25**	**-0,09**	**0,044**
Excl. studies with gastric bypass	25	1386	**52,47**	**93,1%**	**<0,001**	**-4,57**	**-7,81**	**-1,33**	**0,006**	22	1260	**63,72**	**96,9%**	**<0,001**	**-3,74**	**-7,42**	**-0,07**	**0,046**
Excl. studies from Iran	17	973	**91,86**	**93,7%**	**<0,001**	-1,69	-6,69	3,32	0,508	14	847	**112,43**	**97,8%**	**<0,001**	-0,06	-5,92	5,81	0,984
NW	7	244	**33,85**	**84,1%**	**<0,001**	-0,85	-6,11	4,41	0,752	6	224	**38,57**	**94,4%**	**<0,001**	-0,41	-5,77	4,96	0,882
OW	10	640	**71,94**	**93,6%**	**<0,001**	**-7,49**	**-13,29**	**-1,69**	**0,001**	8	534	**106,16**	**95,9%**	**<0,001**	-8,11	-16,28	0,07	0,052
OB	9	582	**91,51**	**91,5%**	**<0,001**	-3,37	-10,17	3,44	0,332	9	582	**101,58**	**95,1%**	**<0,001**	-3,18	-10,02	3,65	0,361
IFG	4	168	**44,68**	**82,5%**	**0,001**	-2,76	-10,46	4,94	0,483	3	106	**94,71**	**88,7%**	**<0,001**	-1,83	-13,55	9,90	0,760
T2DM	4	228	0,00	0,0%	0,728	-1,94	-5,11	1,23	0,230	4	228	0,00	0,0%	0,763	1,12	-3,12	5,35	0,605
NAFLD	12	658	**37,63**	**93,5%**	**<0,001**	**-10,17**	**-14,29**	**-6,04**	**<0,001**	10	594	**33,95**	**96,1%**	**<0,001**	**-9,94**	**-14,07**	**-5,80**	**<0,001**
Dose > 10^8 & ≤ 10^9	2	127	1,03	51,4%	0,152	**-16,53**	**-18,41**	**-14,64**	**<0,001**	2	127	**25,20**	**94,6%**	**<0,001**	**-19,57**	**-26,72**	**-12,43**	**<0,001**
Dose > 10^9 & ≤ 10^{10}	6	307	**33,39**	**84,6%**	**<0,001**	-7,40	-12,98	**-1,82**	**0,009**	6	307	**30,40**	**80,5%**	**<0,001**	**-6,42**	**-11,90**	**-0,93**	**0,022**
Dose > 10^{10} & ≤ 10^{11}	12	750	0,00	0,0%	0,569	-1,31	-3,07	0,45	0,145	10	668	0,00	0,0%	0,930	-0,67	-2,13	0,80	0,373
Dose > 10^{11} & ≤ 10^{12}	4	211	**31,26**	**77,0%**	**0,004**	-1,08	-7,69	5,53	0,749	3	167	6,09	67,9%	0,044	1,65	-1,92	5,22	0,364
Pill	15	822	**43,78**	**93,6%**	**<0,001**	**-7,94**	**-11,86**	**-4,03**	**<0,001**	12	696	**37,72**	**95,8%**	**<0,001**	**-8,54**	**-12,66**	**-4,41**	**<0,001**
FM & Y	7	341	0,90	8,2%	0,366	0,90	-1,54	3,34	0,469	7	341	0,00	0,0%	0,534	0,19	-1,20	1,58	0,790

	ALAT (U/l)									**ASAT (U/l)**								
	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P	RCT	n	τ^2	I^2	P(het)	E	lb	ub	P
1 species	12	672	0,00	0,0%	0,530	-0,42	-2,14	1,30	0,632	10	590	0,00	0,0%	0,484	0,15	-1,02	1,31	0,484
2 species	4	163	**19,92**	**61,9%**	**0,049**	0,05	-5,46	5,55	0,987	4	163	17,38	58,1%	0,067	-0,18	-5,59	5,23	0,949
3 or more species	10	631	**39,40**	**94,9%**	**<0,001**	**-4,40**	**-7,58**	**-1,22**	**<0,001**	9	587	**33,39**	**96,4%**	**<0,001**	**-10,90**	**-15,39**	**-6,41**	**<0,001**
B. bif.	3	245	0,00	0,00%	0,403	-2,72	-6,58	1,14	0,167	3	245	0,00	0,00%	0,885	-3,01	-6,81	0,79	0,120
B. brev.	8	435	**46,81**	**92,5%**	**<0,001**	**-9,97**	**-15,48**	**-4,46**	**<0,001**	7	391	**66,73**	**93,8%**	**<0,001**	**-10,75**	**-17,65**	**-3,86**	**0,002**
B. lac.	6	490	7,19	47,9%	0,087	**-3,94**	**-7,09**	**-0,80**	**0,014**	5	446	0,00	0,0%	0,731	-1,35	-3,26	0,56	0,167
B. lon.	10	579	**44,37**	**95,3%**	**<0,001**	**-8,61**	**-13,28**	**-3,95**	**<0,001**	10	579	**34,98**	**96,1%**	**<0,001**	**-9,64**	**-14,04**	**-5,24**	**<0,001**
S. ther.	9	486	**41,47**	**95,5%**	**<0,001**	**-9,92**	**-14,67**	**-5,17**	**<0,001**	8	442	**35,05**	**96,9%**	**<0,001**	**-10,43**	**-15,17**	**-5,69**	**<0,001**
Lc. lac.	2	115	11,11	42,9%	0,186	4,19	-2,77	11,15	0,238	2	115	13,04	63,7%	0,097	0,70	-5,56	6,95	0,828
L. acid.	11	664	40,04	90,2%	**<0,001**	-8,23	-12,55	-3,91	**<0,001**	10	620	**52,32**	**91,2%**	**<0,001**	**-8,93**	**-14,13**	**-3,73**	**0,001**
L. del.	8	463	**44,15**	**96,2%**	**<0,001**	**-10,05**	**-15,20**	**-4,90**	**<0,001**	8	463	**33,13**	**96,6%**	**<0,001**	**-11,38**	**-16,27**	**-6,49**	**<0,001**
L. gas.	3	189	0,00	0,0%	0,933	0,60	-2,11	3,31	0,664	2	127	0,00	0,0%	0,956	0,14	-1,61	1,90	0,872
L. rham.	9	506	**40,35**	**95,1%**	**<0,001**	**-11,67**	**-16,64**	**-6,70**	**<0,001**	8	486	**33,45**	**96,8%**	**<0,001**	**-11,22**	**-15,79**	**-6,64**	**<0,001**
L. cas. gr.	10	602	**46,34**	**95,6%**	**<0,001**	**-8,48**	**-13,19**	**-3,76**	**<0,001**	9	558	**37,51**	**96,8%**	**<0,001**	**-9,84**	**-14,54**	**-5,13**	**<0,001**
L. plan.	5	251	**26,58**	**62,1%**	**0,032**	-1,64	-7,81	4,52	0,601	4	207	9,84	60,3%	0,056	0,94	-3,09	4,97	0,648

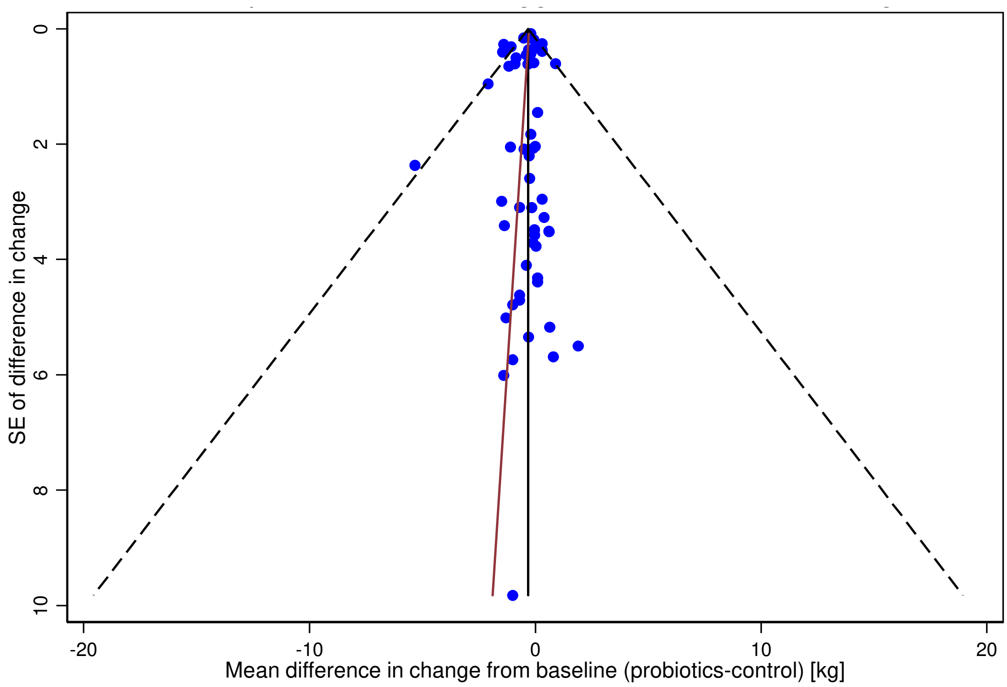
	GGT (U/l)								
	RCT	n	τ^2	I²	P(het)	E	lb	ub	P
All studies	14	816	**25,43**	**86,9%**	**<0,001**	-3,14	-6,60	0,33	0,076
Excl. low quality studies	10	657	**25,78**	**79,5%**	**<0,001**	**-4,48**	**-8,56**	**-0,40**	**0,031**
Excl. low/medium quality studies	8	551	**27,35**	**83,6%**	**<0,001**	**-4,76**	**-9,14**	**-0,38**	**0,033**
Excl. studies with children	14	816	**25,43**	**86,9%**	**<0,001**	-3,14	-6,60	0,33	0,076
Excl. studies with pregnant women	14	816	**25,43**	**86,9%**	**<0,001**	-3,14	-6,60	0,33	0,076
Excl. studies with gastric bypass	13	736	**25,99**	**87,9%**	**<0,001**	-3,08	-6,66	0,51	0,093
Excl. studies from Iran	12	728	0,00	0,0%	0,985	-0,97	-2,10	0,17	0,094
NW	4	147	0,00	0,0%	0,632	-0,12	-2,43	2,20	0,923
OW	5	292	0,00	0,0%	0,998	-1,11	-2,44	0,23	0,105
OB	5	377	1,56	12,4%	0,335	**-8,90**	**-11,31**	**-6,48**	**<0,001**
IFG	3	122	10,47	22,3%	0,276	-6,26	-13,57	1,04	0,093
NAFLD	4	243	**35,30**	**96,1%**	**<0,001**	-6,45	-12,98	0,08	0,053
Pill	6	349	**33,85**	**93,6%**	**<0,001**	-5,63	-11,44	0,19	0,058
FM & Y	6	258	0,00	0,0%	0,872	-0,25	-2,40	1,90	0,820
1 species	9	553	0,00	0,0%	0,970	-1,01	-3,25	1,23	0,378
2 species	2	56	**58,07**	**86,0%**	**0,007**	-4,44	-15,81	6,92	0,443
3 or more species	3	207	**36,71**	**97,4%**	**<0,001**	-5,23	-12,78	2,33	0,175
B. brev.	3	176	0,00	0,0%	0,564	**-9,77**	**-11,16**	**-8,37**	**<0,001**
B. lac.	2	209	0,00	0,0%	0,727	-3,47	-9,94	3,02	0,295
B. lon.	5	263	**34,12**	**95,3%**	**<0,001**	-4,84	-10,55	0,86	0,096
S. ther.	4	227	**35,17**	**96,4%**	**<0,001**	-3,60	-9,97	2,77	0,268
L. acid.	3	168	0,00	0,0%	0,637	**-9,82**	**-11,20**	**-8,45**	**<0,001**
L. del.	3	147	**36,21**	**97,6%**	**<0,001**	-3,49	-10,48	3,50	0,328
L. gas.	3	189	0,00	0,0%	0,705	-0,59	-5,92	4,74	0,828
L. rham.	3	207	**36,71**	**97,4%**	**<0,001**	-5,23	-12,78	2,33	0,175
L. cas. gr.	3	207	**36,71**	**97,4%**	**<0,001**	-5,23	-12,78	2,33	0,175

Heading:	RCT, number of trials; n, number of subjects; τ^2, between study variance; I^2, heterogeneity measure; P(het), P value of heterogeneity test relating on I^2 measure; E, estimate; lb, lower boundary of 95% confidence interval; ub, upper boundary of confidence interval; P value of Wald test.
Outcome:	ALAT, alanine aminotransferase; ASAT, aspartate aminotransferase; GGT, gamma-glutamyl transferase.
Populations:	NW, normal weight; OW, overweight; OB, obese; IFG, impaired fasting glucose; T2DM, type 2 diabetes mellitus; NAFLD, nonalcoholic fatty liver disease.
Food form:	FM & Y, fermented milk or yogurt.
Species:	*B. bif., Bifidobacterium bifidum; B. brev., Bifidobacterium breve; B. lac., Bifidobacterium animalis* subsp. *lactis; B. lon., Bifidobacterium longum; S. ther., Streptococcus salivarius* subsp. *thermophilus; Lc. lac., Lactococcus lactis;. L. hel., Lactobacillus helveticus; L. acid., Lactobacillus acidophilus; L. del., Lactobacillus delbrueckii; L. gas., Lactobacillus gasseri; L. reut., Lactobacillus reuteri; L. fer., Lactobacillus fermentum; L. rham., Lactobacillus rhamnosus; L. cas. gr., Lactobacillus casei or paracasei; L. cur., Lactobacillus curvatus; L. sal., Lactobacillus salivarius; L. plan., Lactobacillus plantarum.*

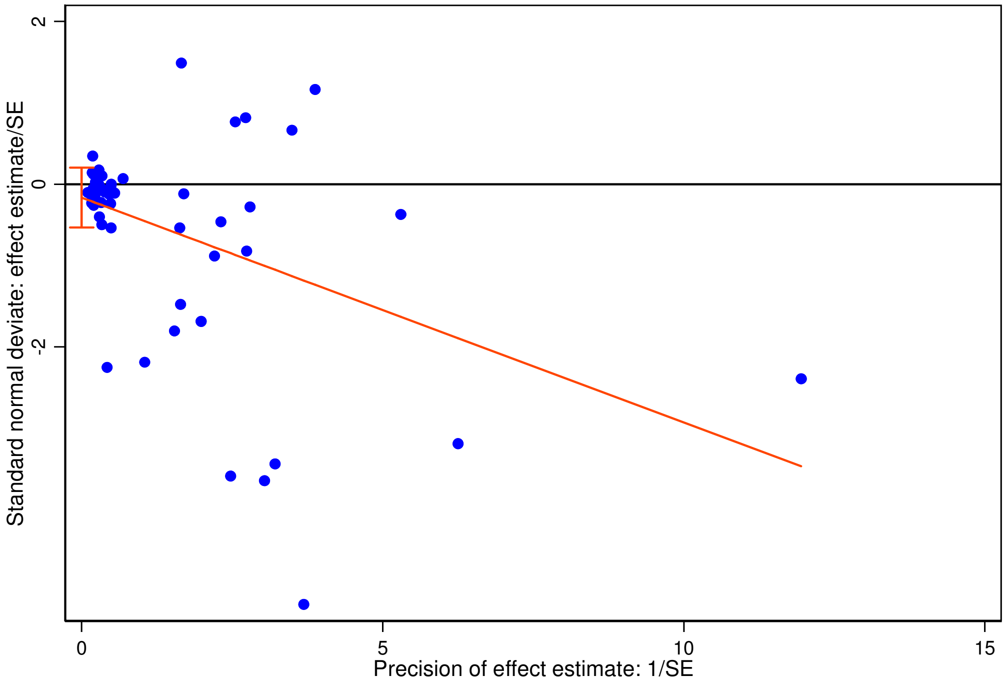
SI conversion factors: To convert ALAT, ASAT, and GGT to µkat/L, multiply values by 0.016.

Supplementary Figures

Supplementary Figure 1 Funnel plot, body weight.



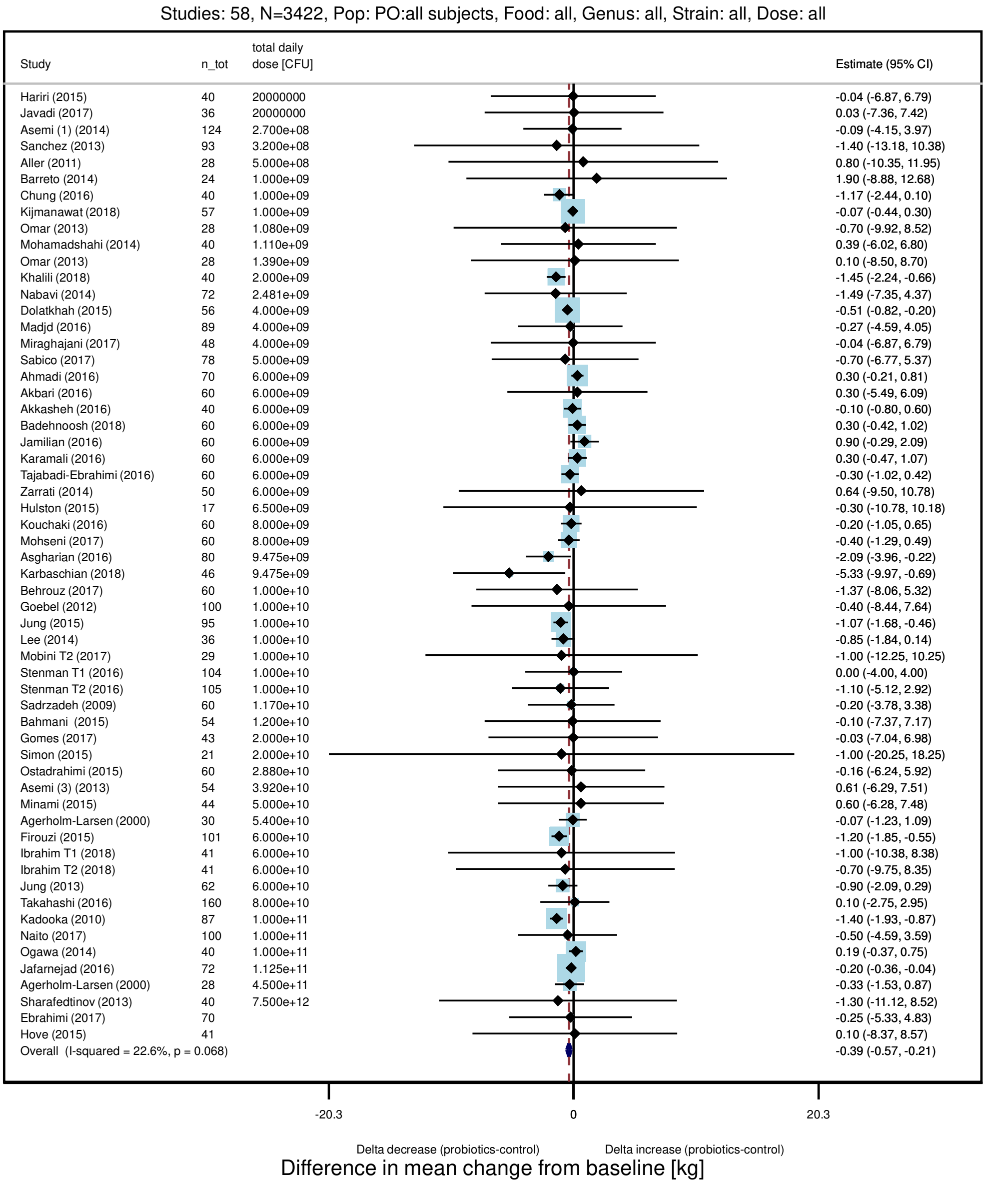
Supplementary Figure 2 Galbraith's plot for small study effects, body weight.



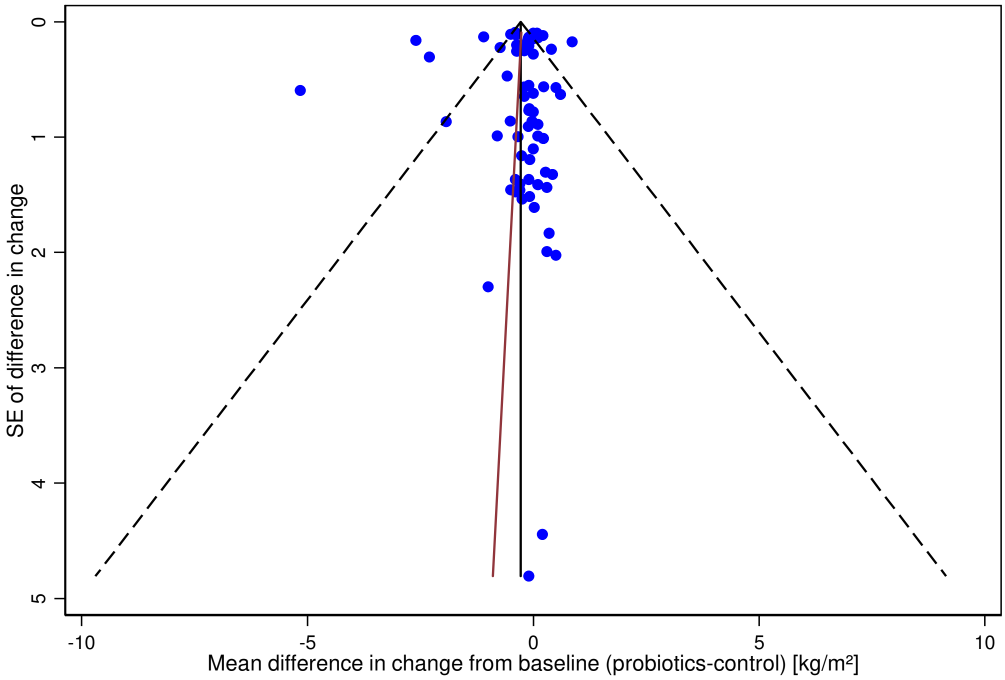
Legend Figure 2:

Hypothesis tests for small study effects: Egger's test: bias coefficient=-0.17, P=0.371. Begg's test: adj. Kendall's score=-60, P=0.687.

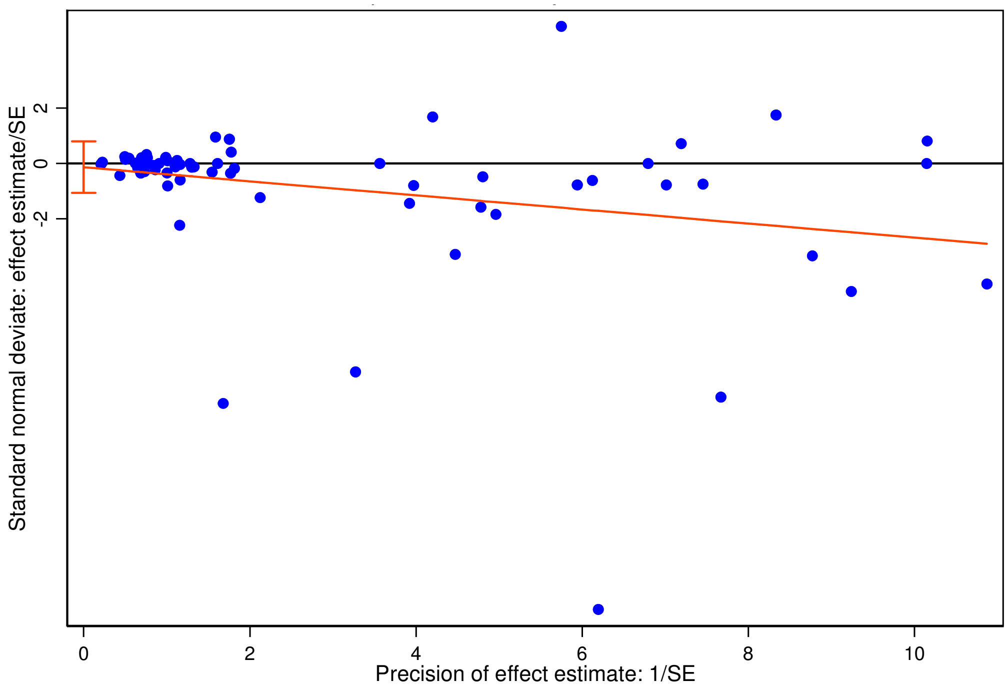
Supplementary Figure 3 Overall estimate of probiotics effect on body weight.



Supplementary Figure 4 Funnel plot, body mass index.



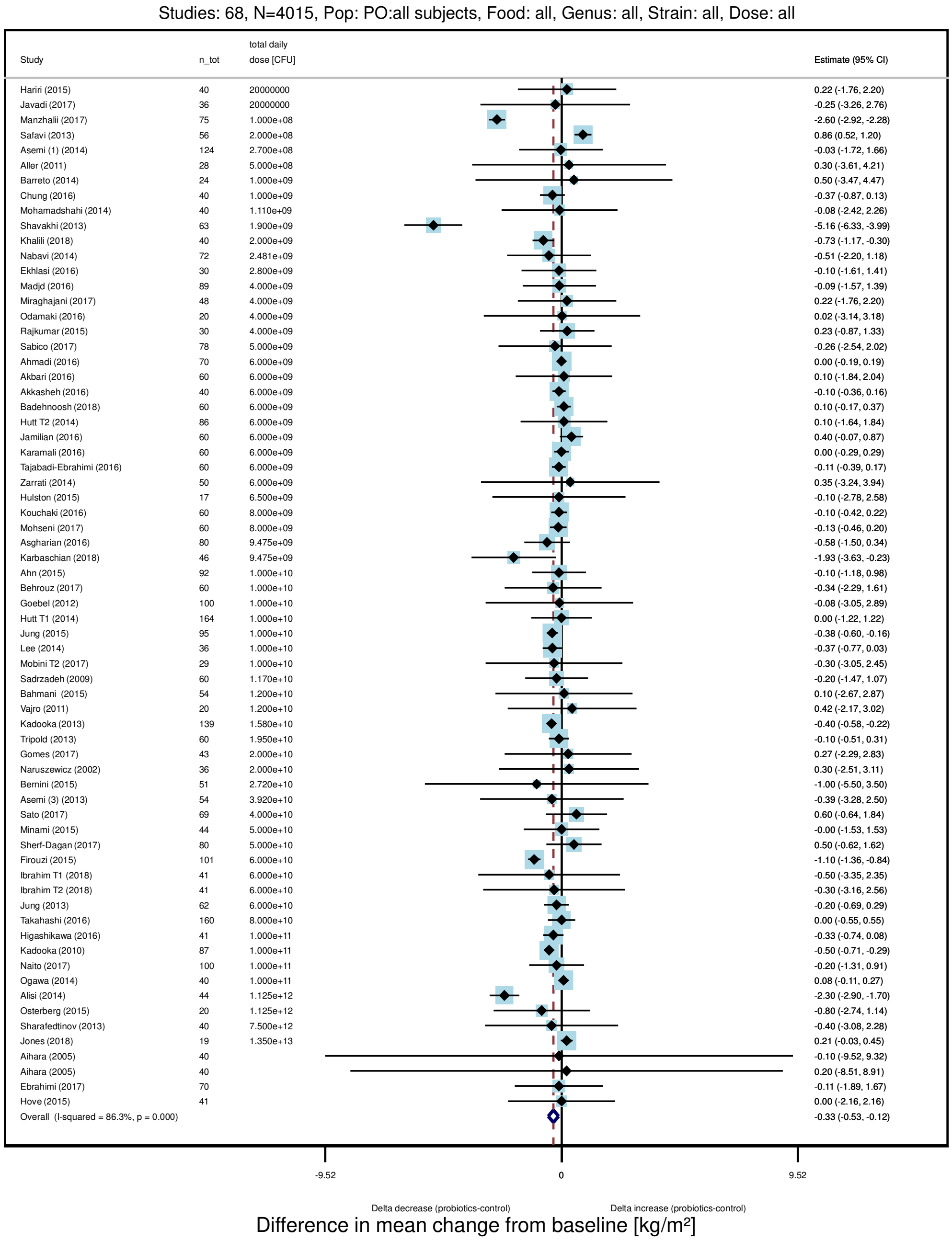
Supplementary Figure 5 Galbraith's plot for small study effects, body mass index.



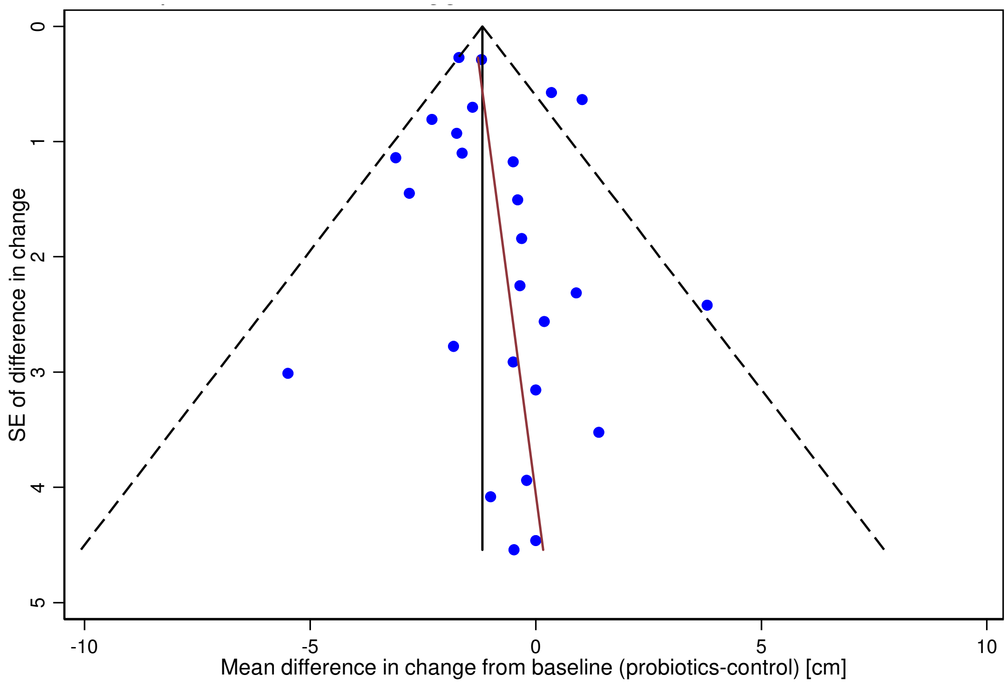
Legend Figure 5:

Hypothesis tests for small study effects: Egger's test: bias coefficient=-0.13, P=0.776. Begg's test: adj. Kendall's score=-309, P=0.976.

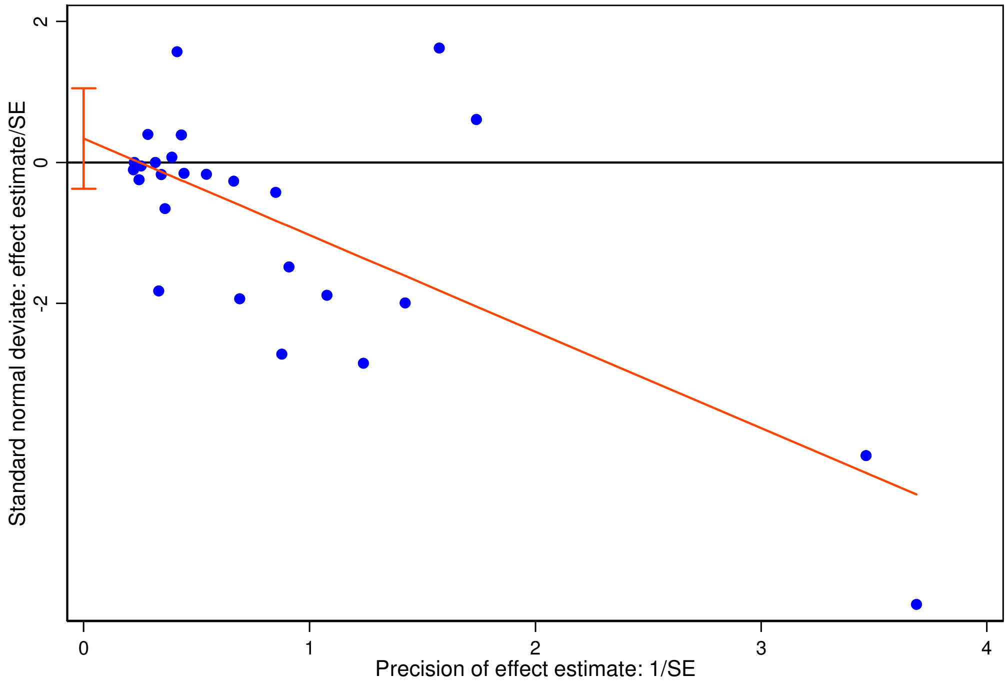
Supplementary Figure 6 Overall estimate of probiotics on body mass index.



Supplementary Figure 7 Funnel plot, waist circumference.



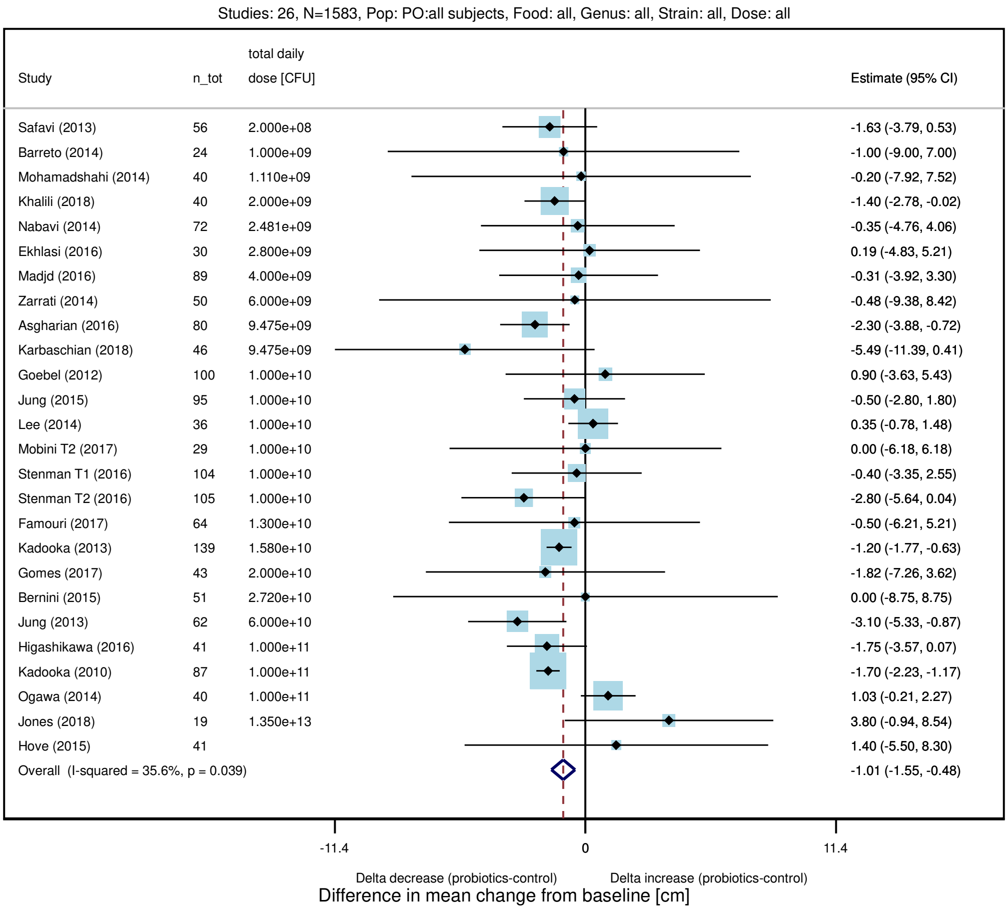
Supplementary Figure 8 Galbraith's plot for small study effects, waist circumference.



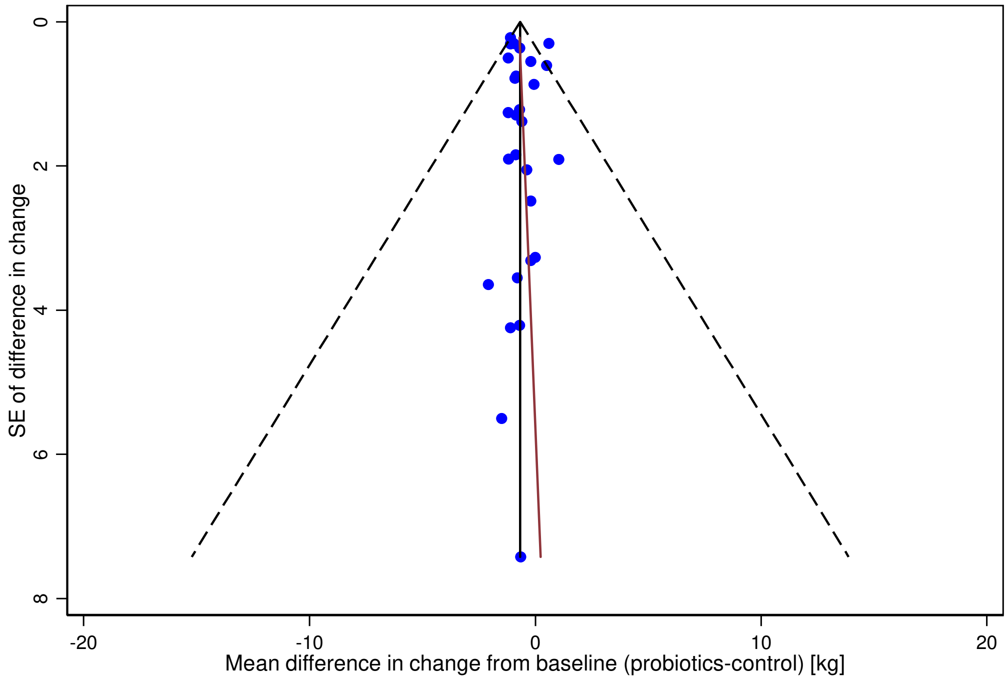
Legend Figure 8:

Hypothesis tests for small study effects: Egger's test: bias coefficient=0.34, P=0.337. Begg's test: adj. Kendall's score=27, P=0.552.

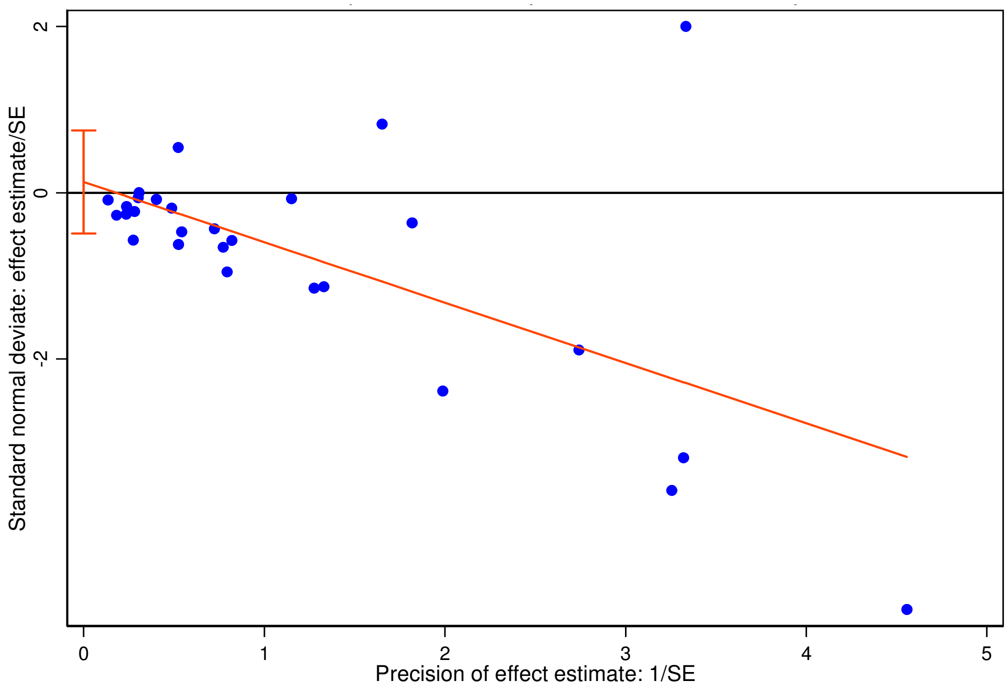
Supplementary Figure 9 Overall estimate of probiotics effect on waist circumference.



Supplementary Figure 10 Funnel plot, body fat mass.



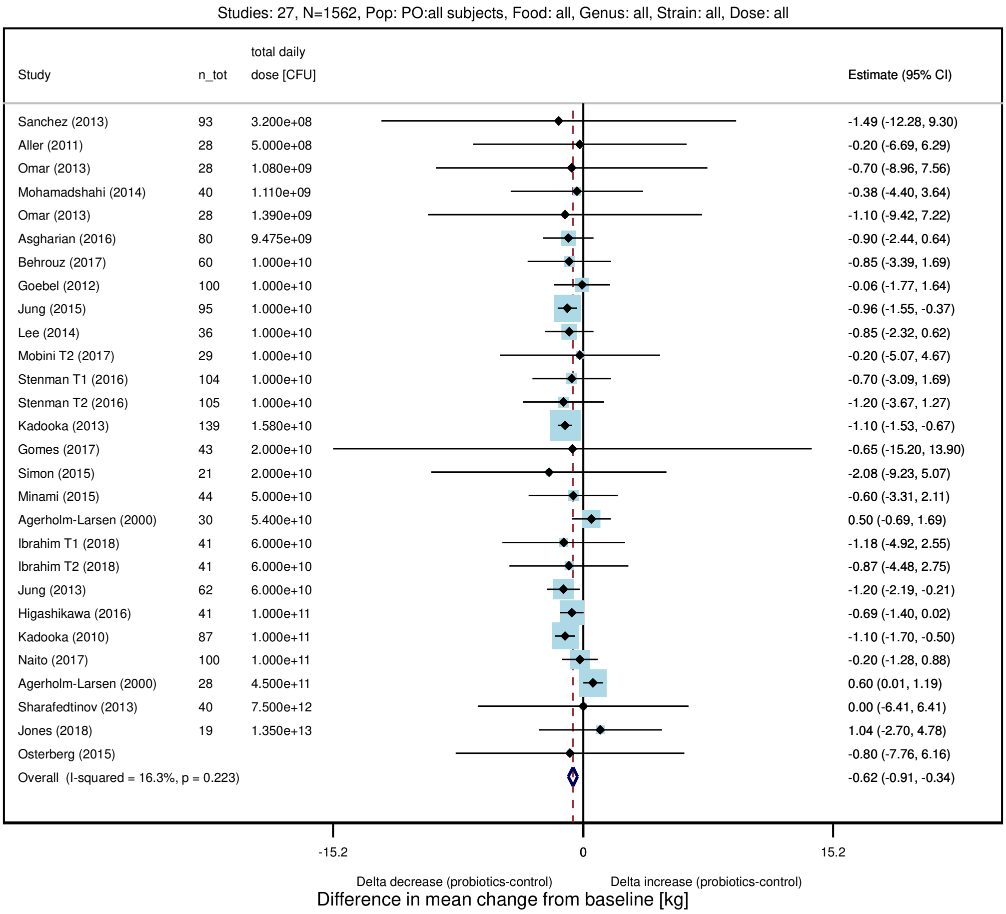
Supplementary Figure 11 Galbraith's plot for small study effects, body fat mass.



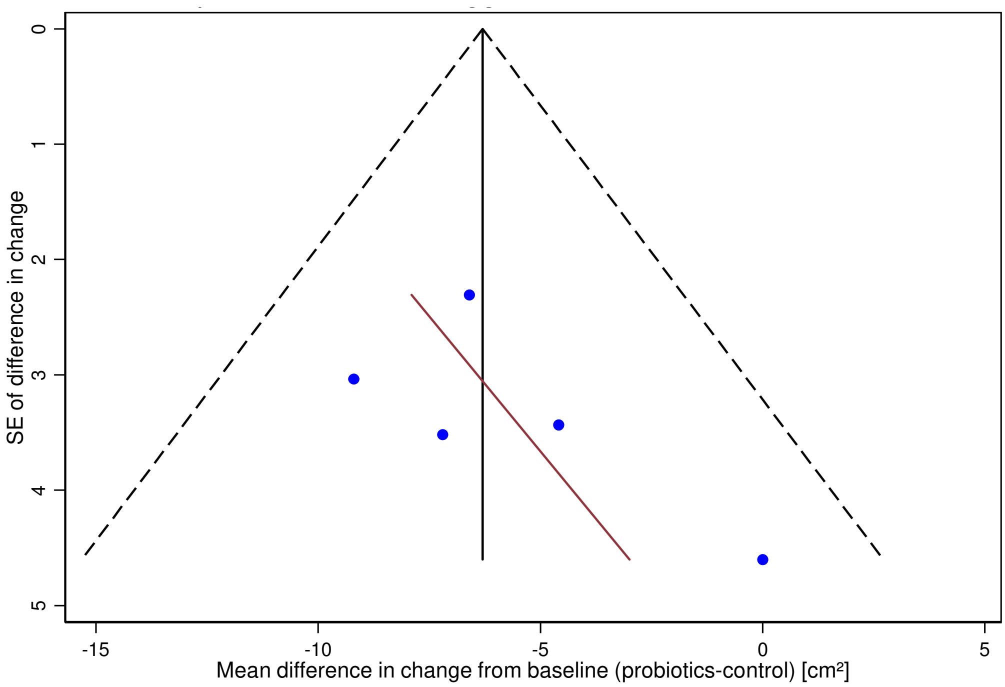
Legend Figure 11:

Hypothesis tests for small study effects: Egger's test: bias coefficient=0.13, P=0.671. Begg's test: adj. Kendall's score=6, P=0.323.

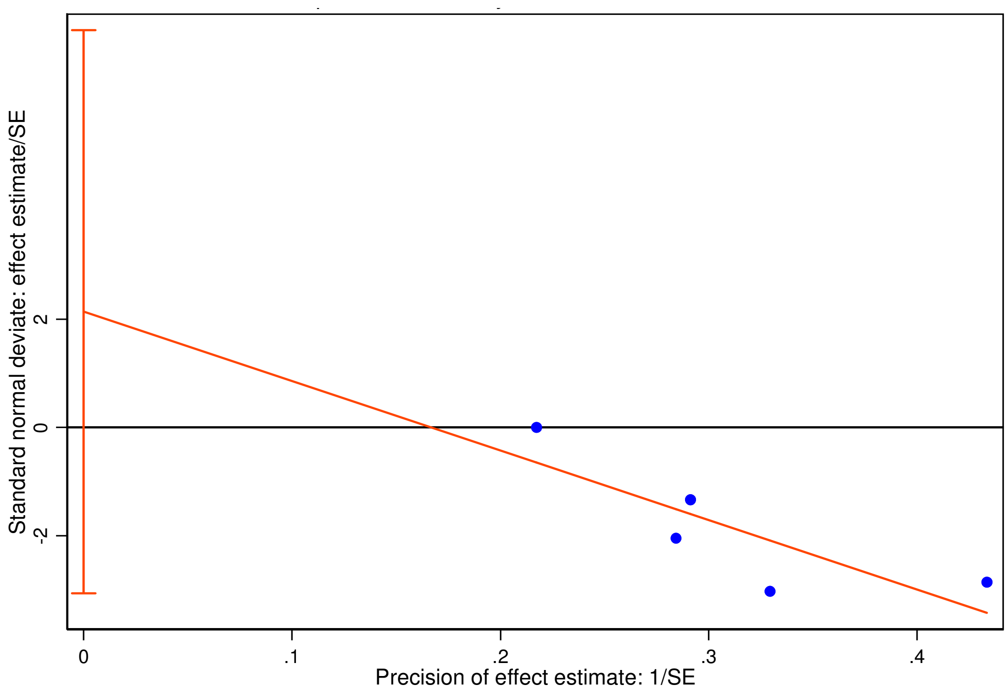
Supplementary Figure 12 Overall estimate of probiotics effect on body fat mass.



Supplementary Figure 13 Funnel plot, visceral adipose tissue.



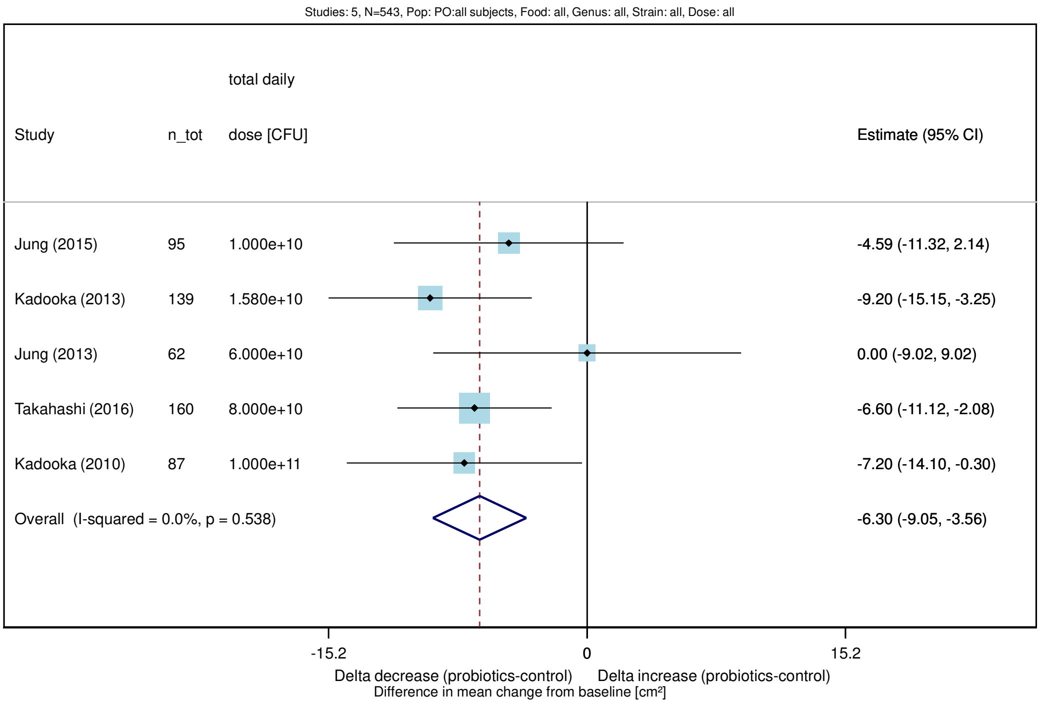
Supplementary Figure 14 Galbraith's plot for small study effects, visceral adipose tissue.



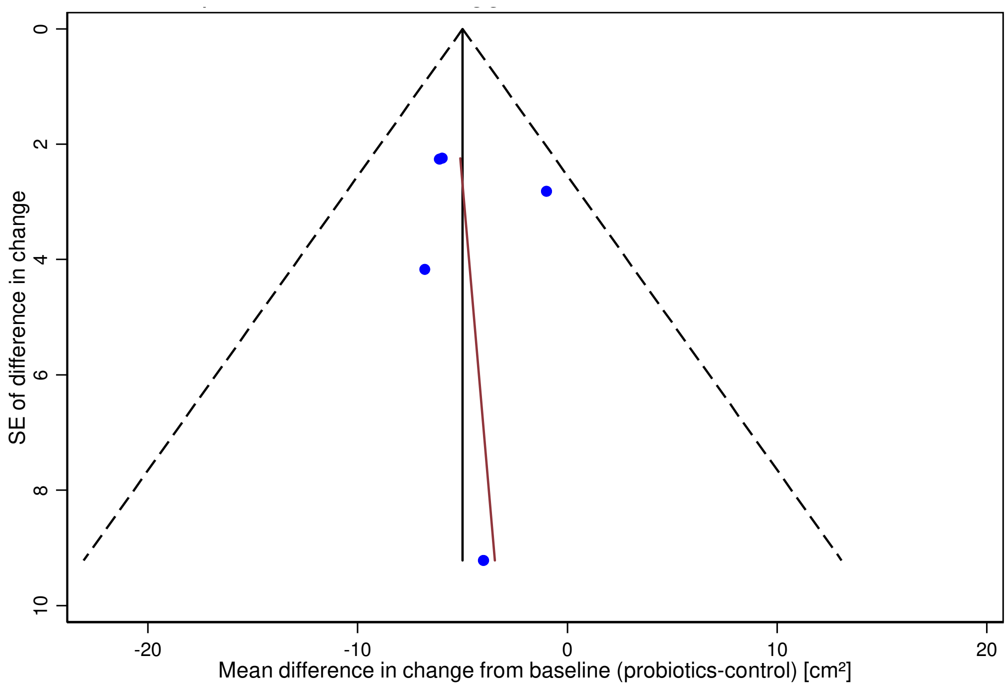
Legend Figure 14:

Hypothesis tests for small study effects: Egger's test: bias coefficient=2.14, P=0.282. Begg's test: adj. Kendall's score=4, P=0.327.

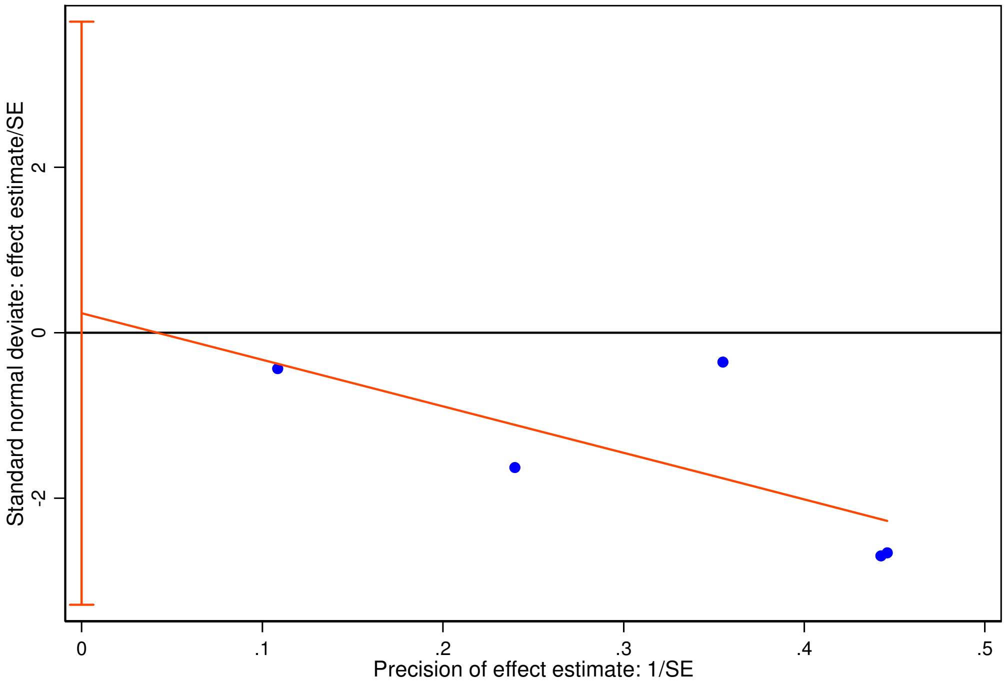
Supplementary Figure 15 Overall estimate of probiotics effect on visceral adipose tissue.



Supplementary Figure 16 Funnel plot, subcutaneous adipose tissue.



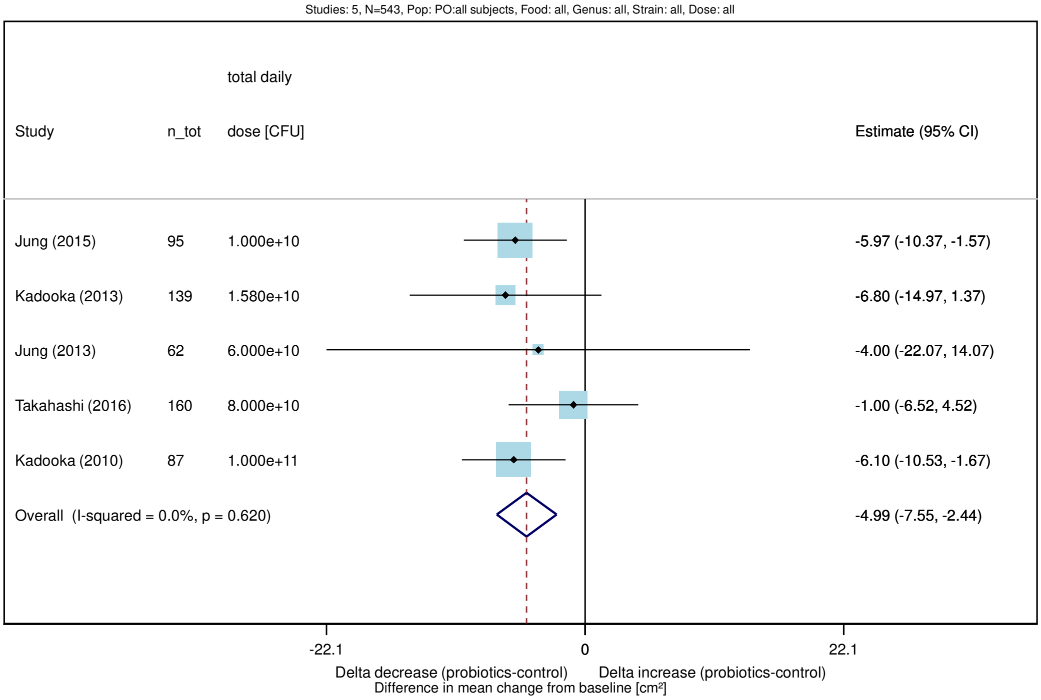
Supplementary Figure 17 Galbraith's plot for small study effects, subcutaneous adipose tissue.



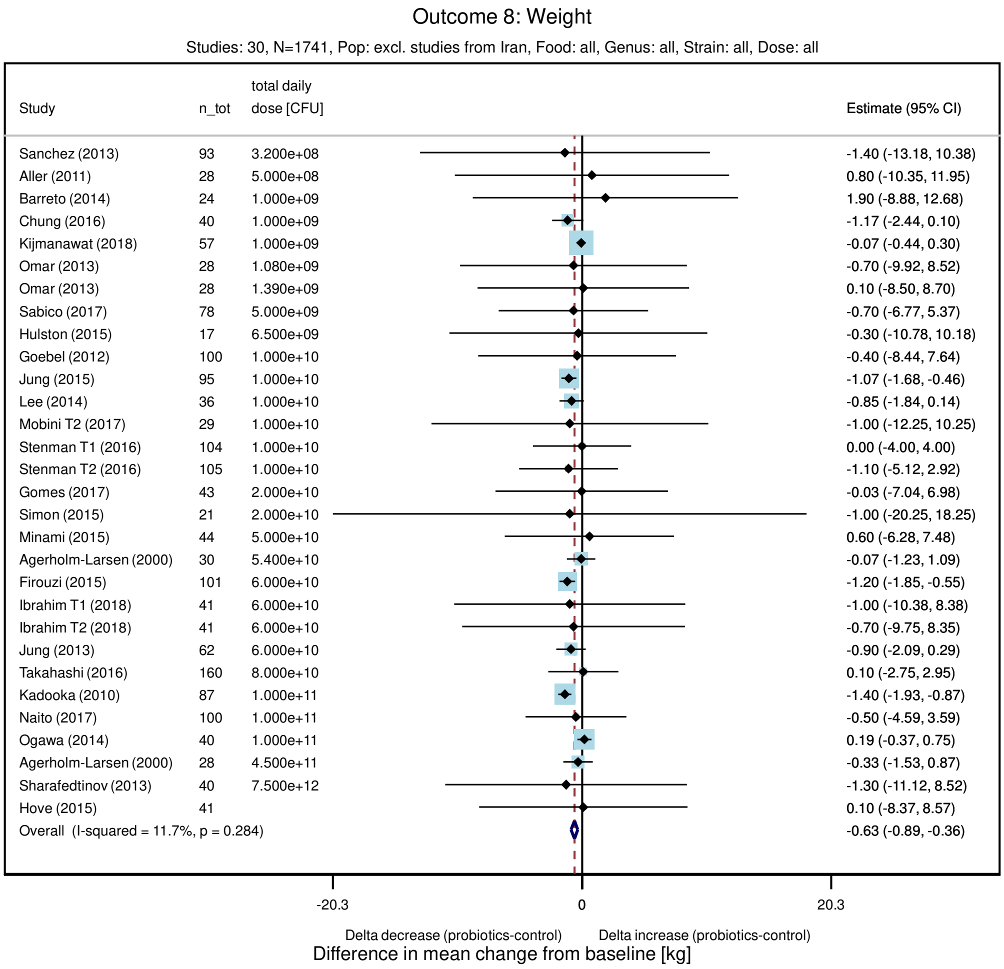
Legend Figure 17:

Hypothesis tests for small study effects: Egger's test: bias coefficient=0.24, P=0.845. Begg's test: adj. Kendall's score=4, P=0.327.

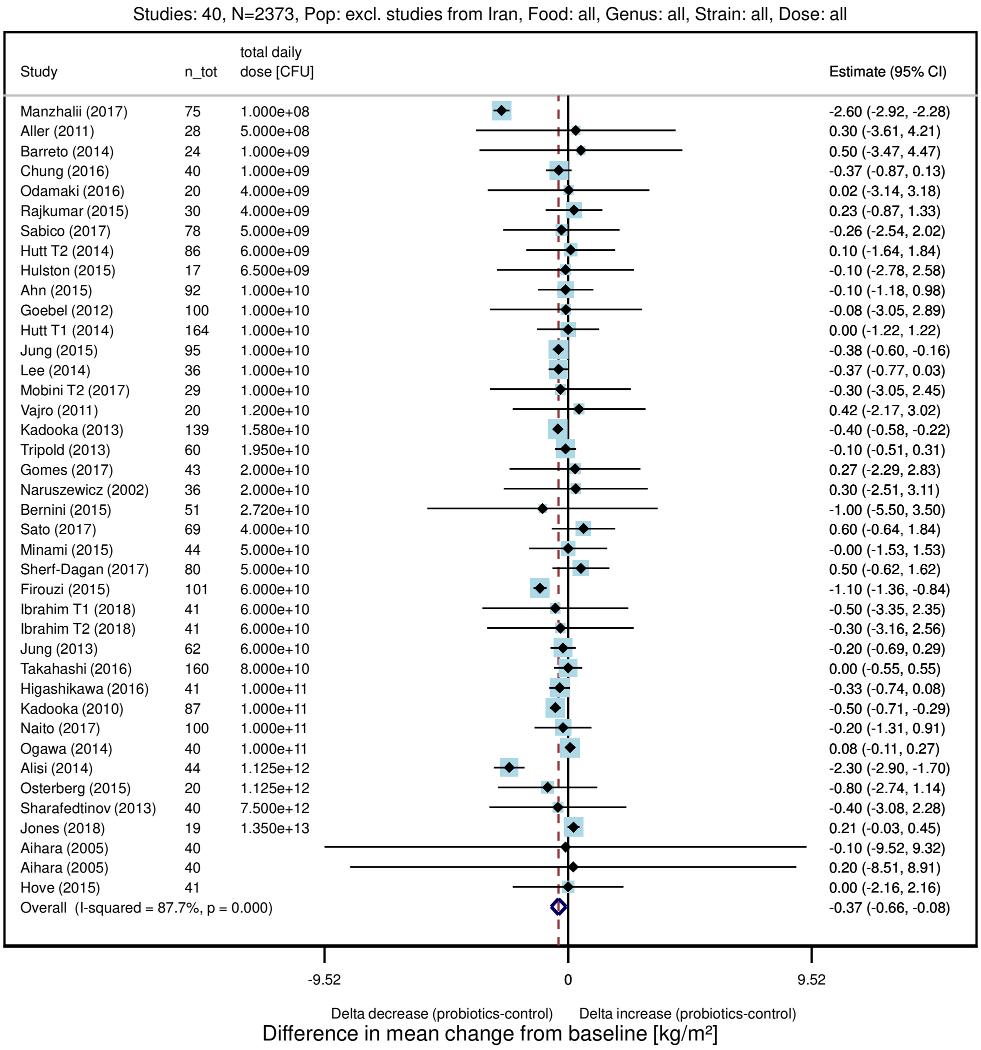
Supplementary Figure 18 Overall estimate of probiotics effect on subcutaneous adipose tissue.



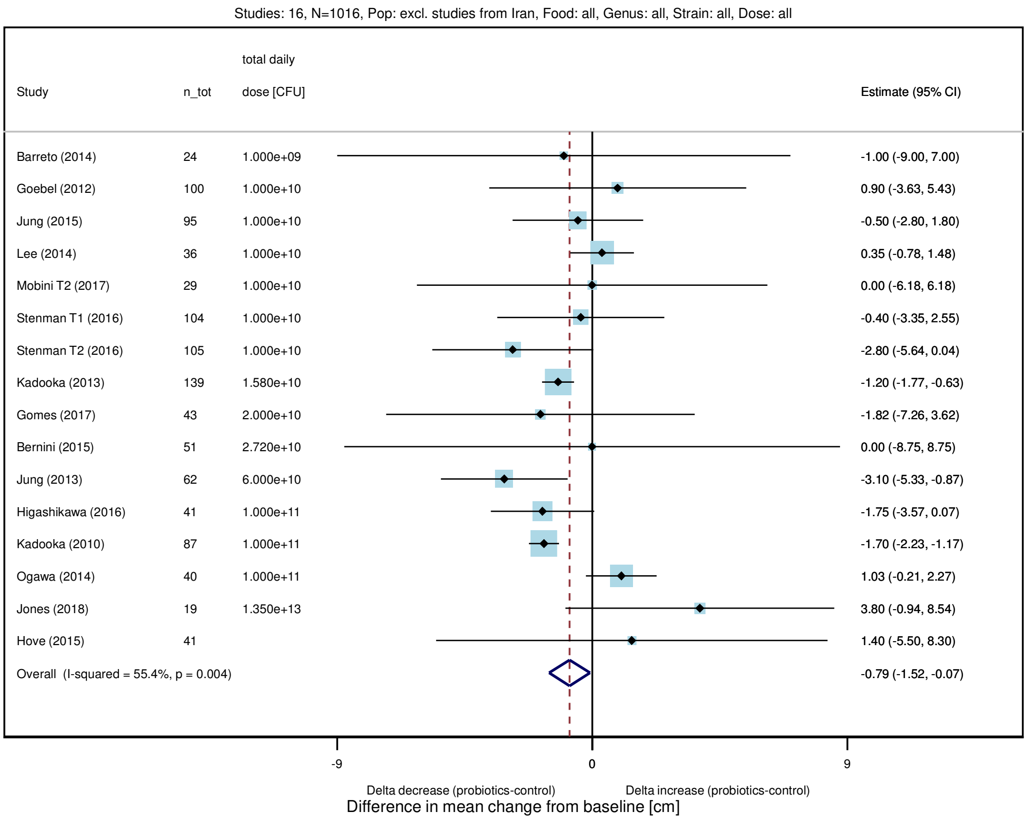
Supplementary Figure 19 Estimate of probiotics effect on body weight excluding studies in Iran.



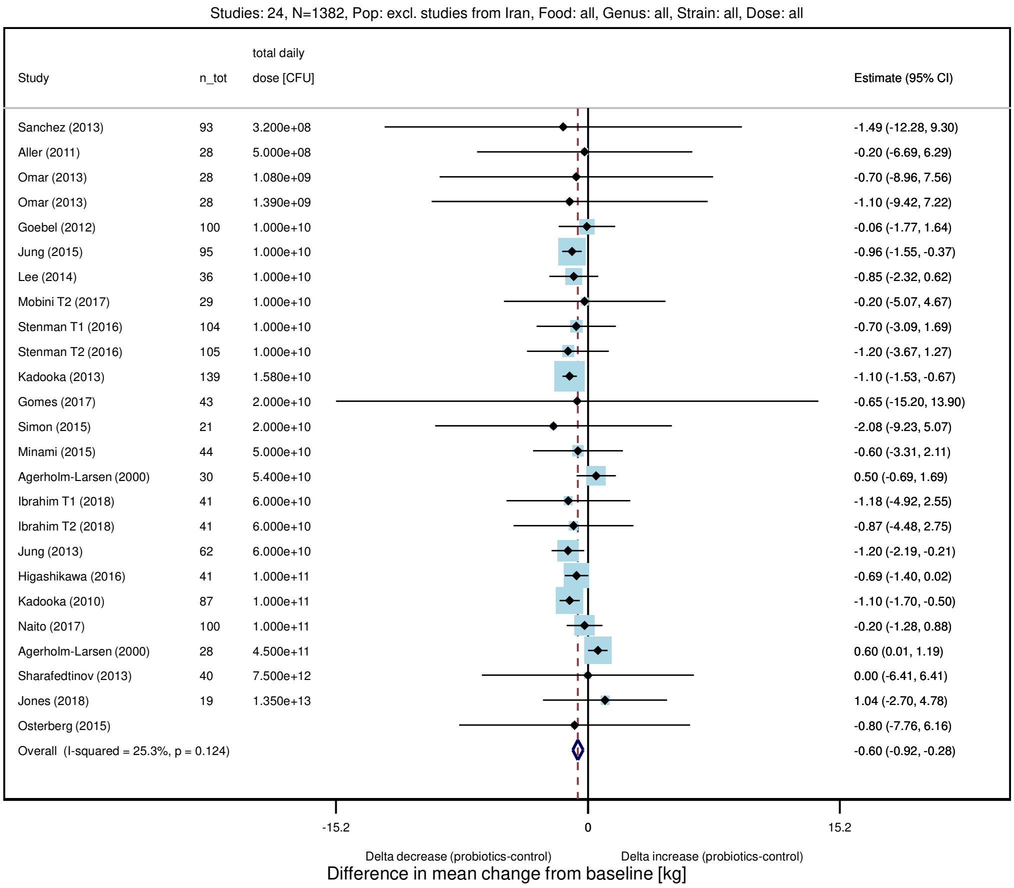
Supplementary Figure 20 Estimate of probiotics effect on body mass index excluding studies conducted in Iran.



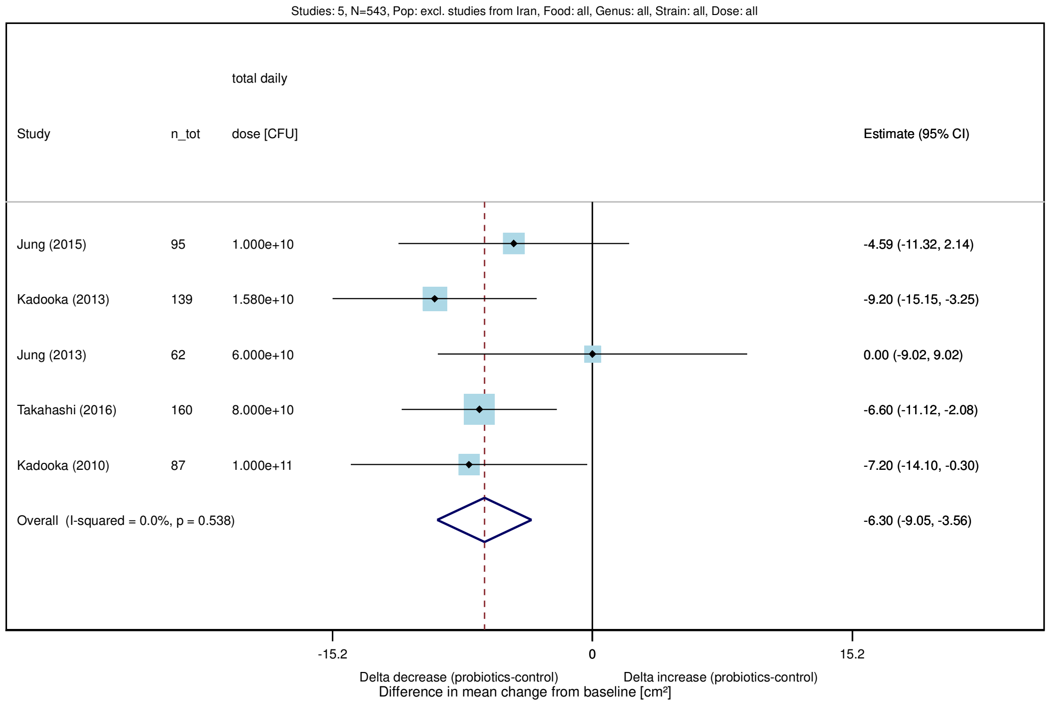
Supplementary Figure 21 Estimate of probiotics effect on waist circumference excluding studies conducted in Iran.



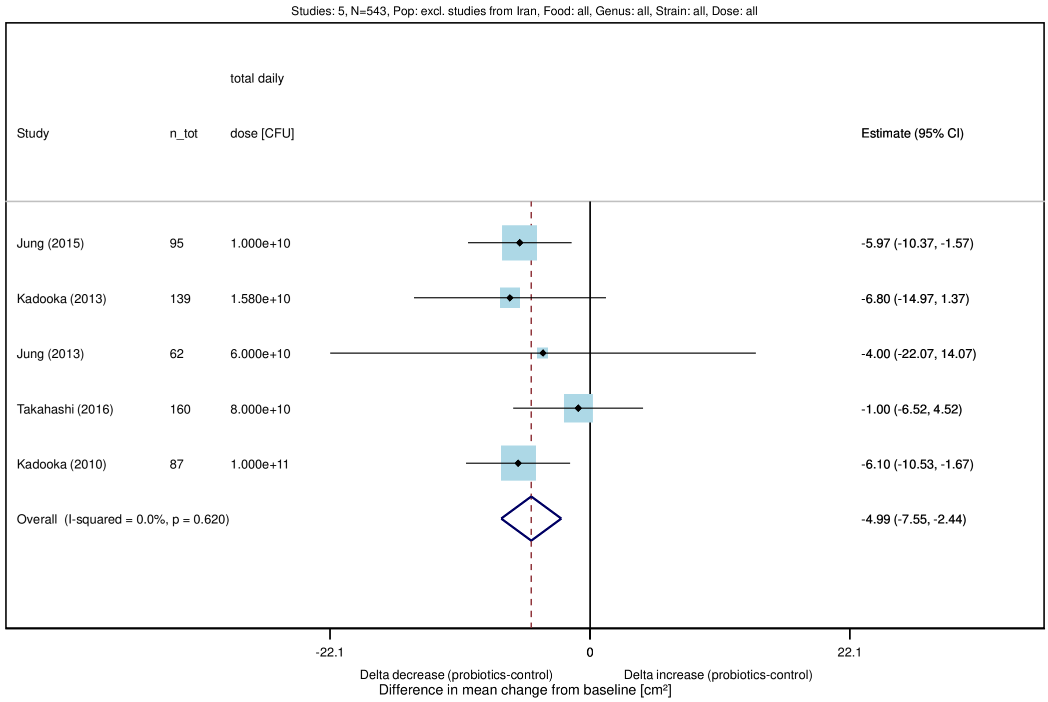
Supplementary Figure 22 Estimate of probiotics effect on body fat mass excluding studies conducted in Iran.



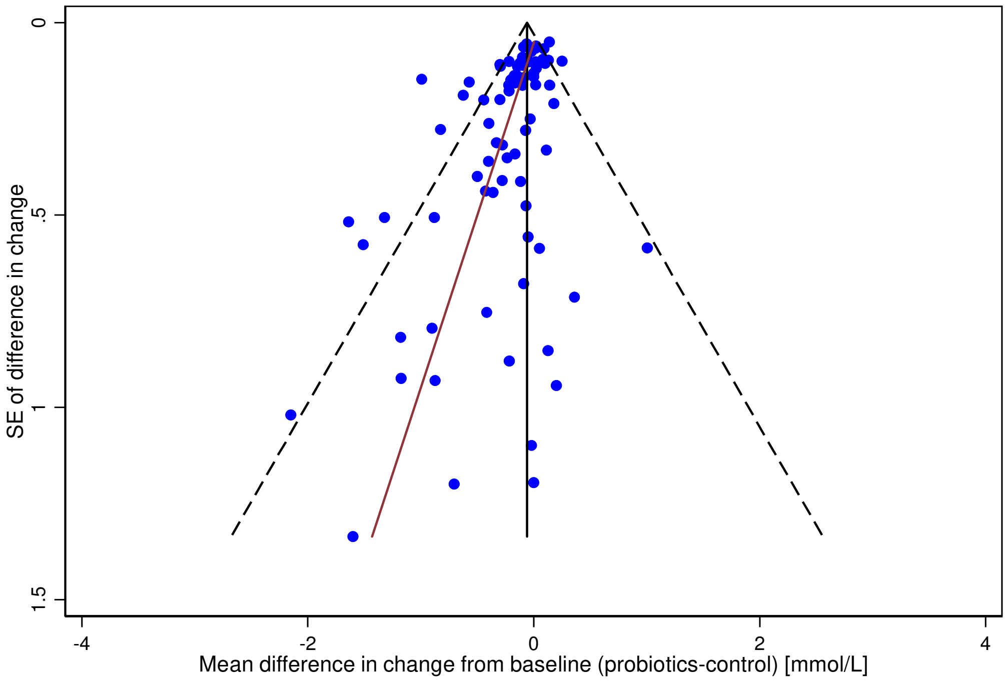
Supplementary Figure 23 Estimate of probiotics effect on visceral adipose tissue excluding studies conducted in Iran.



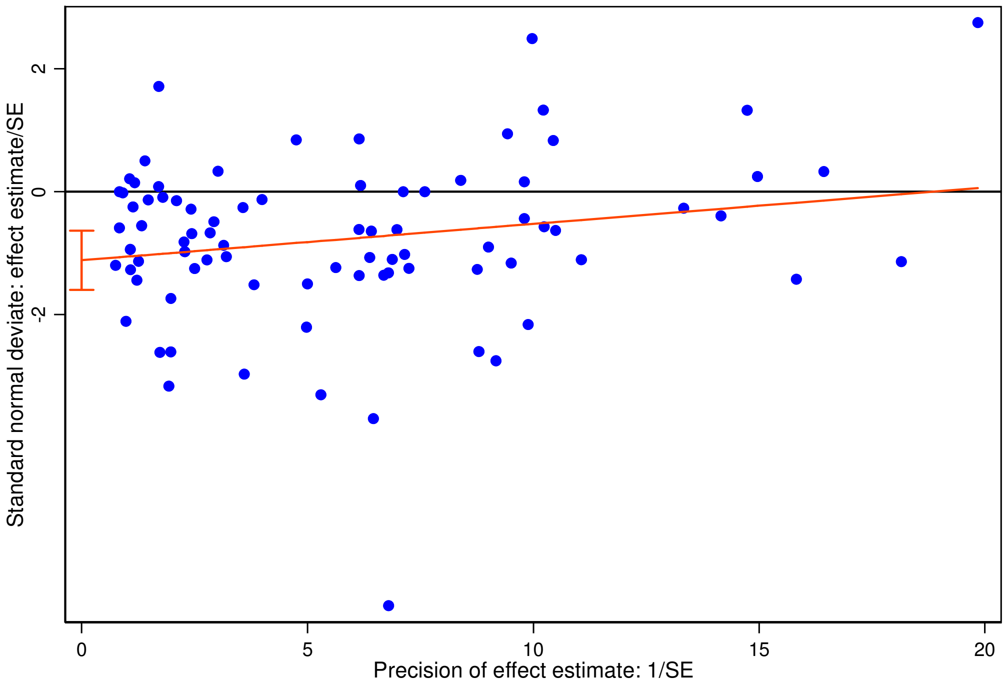
Supplementary Figure 24 Estimate of probiotics effect on subcutaneous adipose tissue excluding studies conducted in Iran.



Supplementary Figure 25 Funnel plot, fasting glucose.



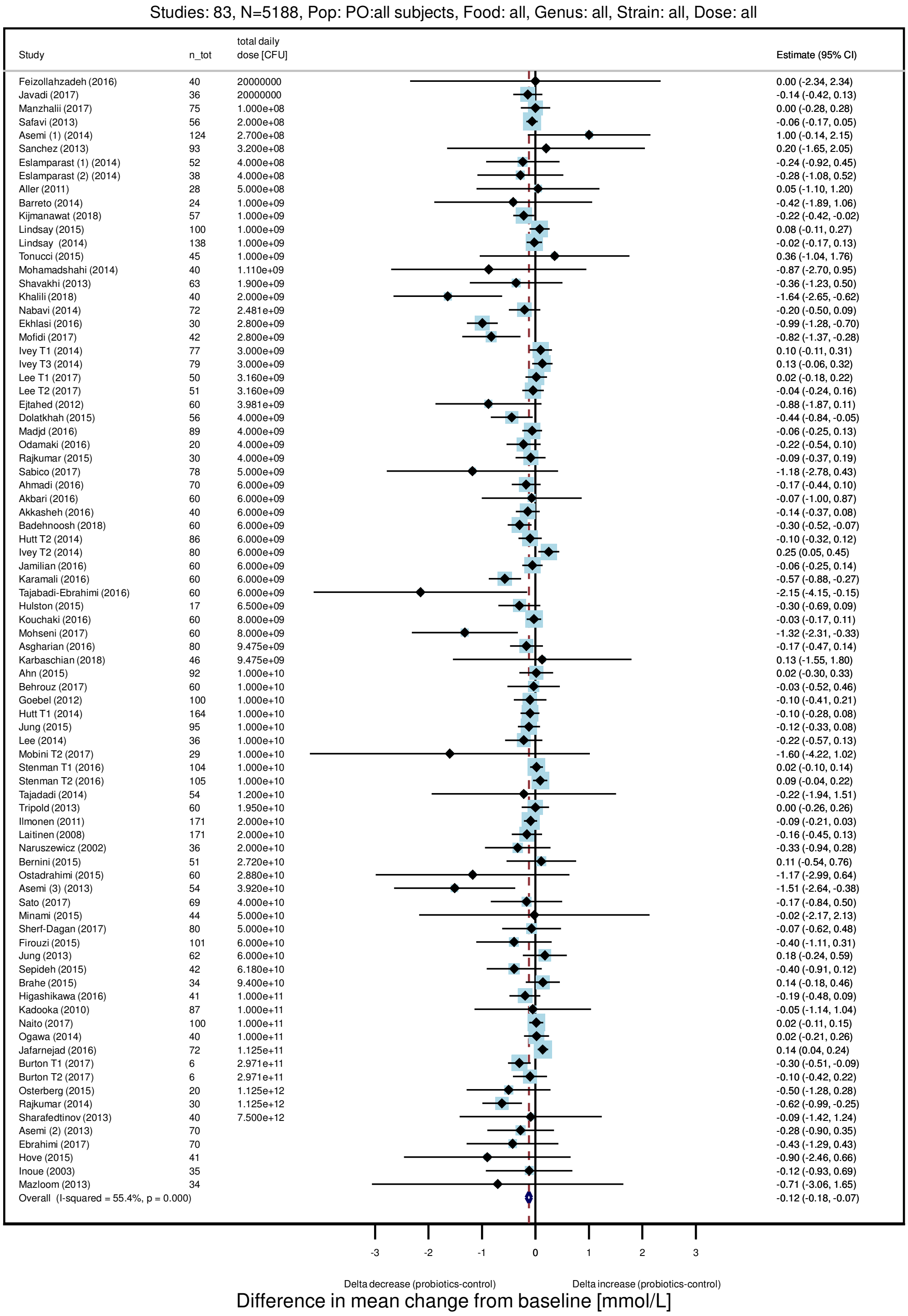
Supplementary Figure 26 Galbraith's plot for small study effects, fasting glucose.



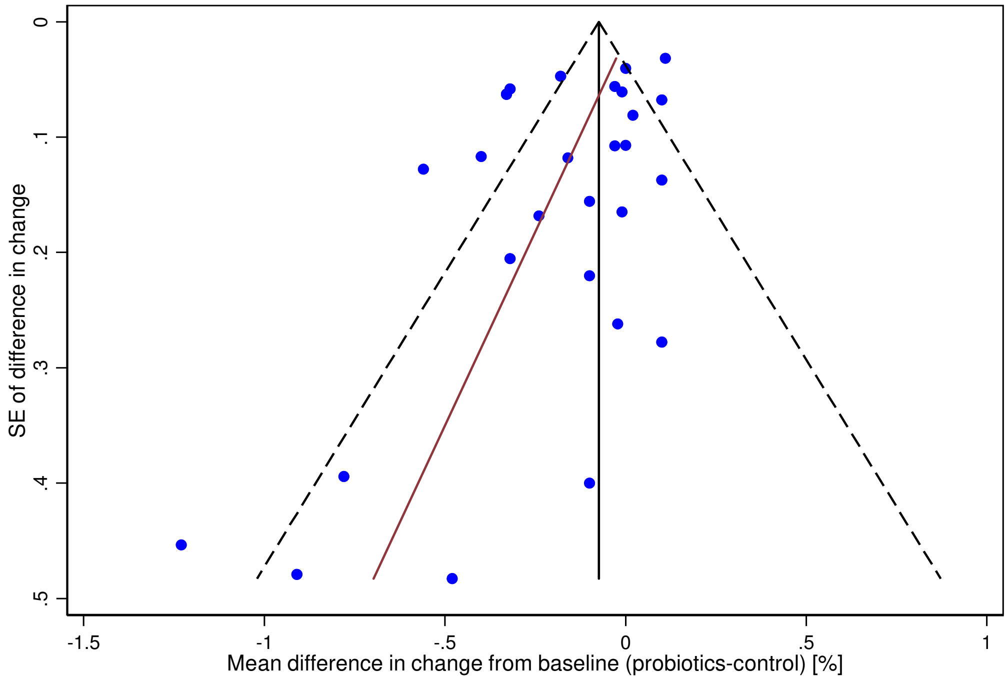
Legend Figure 26:

Hypothesis tests for small study effects: Egger's test: bias coefficient=-1.11, P<0.001. Begg's test: adj. Kendall's score=-710, P=0.005. Filled & trim meta analysis estimator: -0.12 (95%CI: -0.18 to -0.07), P<0.001, no studies filled or excluded.

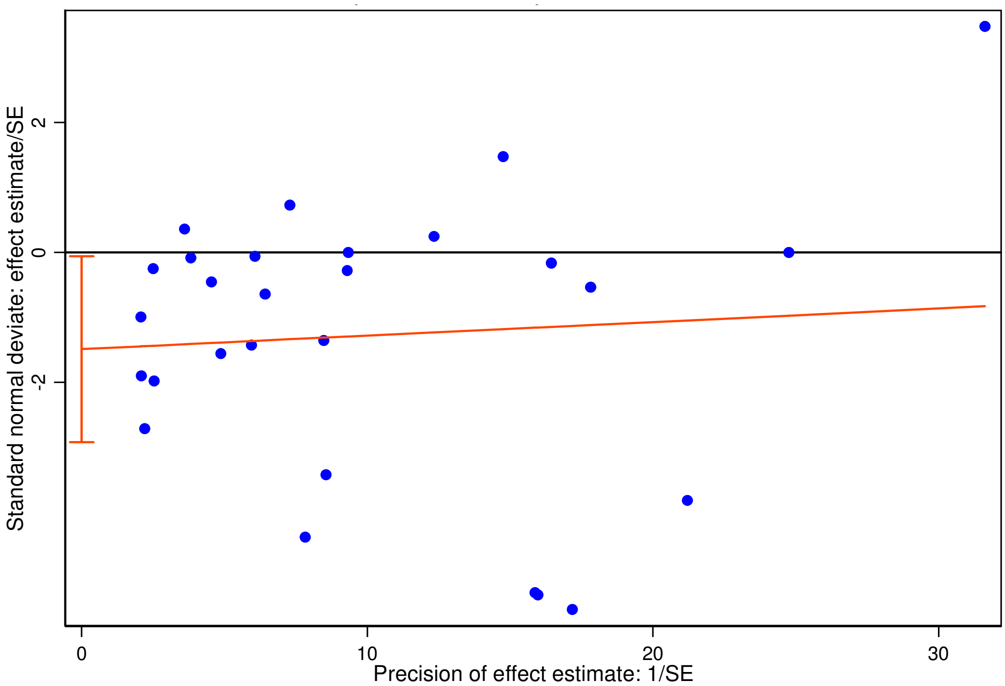
Supplementary Figure 27 Overall estimate of probiotics effect on fasting glucose.



Supplementary Figure 28 Funnel plot, glycated haemoglobin.



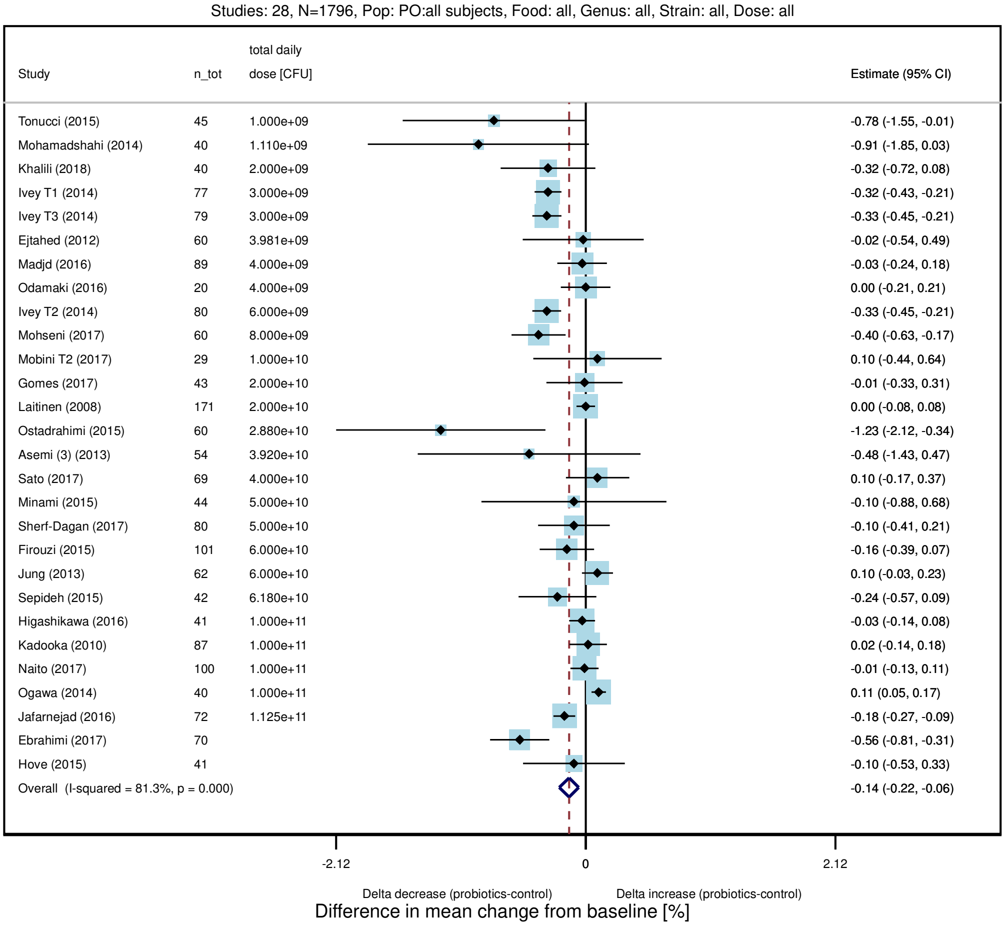
Supplementary Figure 29 Galbraith's plot for small study effects, glycated haemoglobin.



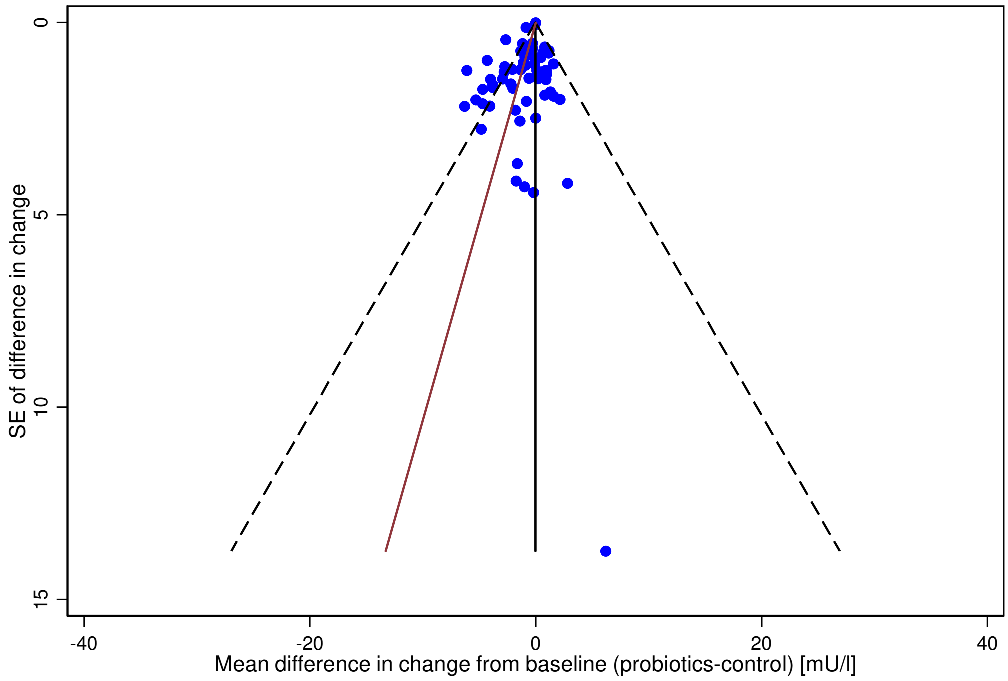
Legend Figure 29:

Hypothesis tests for small study effects: Egger's test: bias coefficient=-1.49, P=0.042. Begg's test: adj. Kendall's score=-68, P=0.179. Filled & trim meta analysis estimators: -0.12 (95%CI: -0.18 to -0.07), P<0.001, no studies filled or excluded.

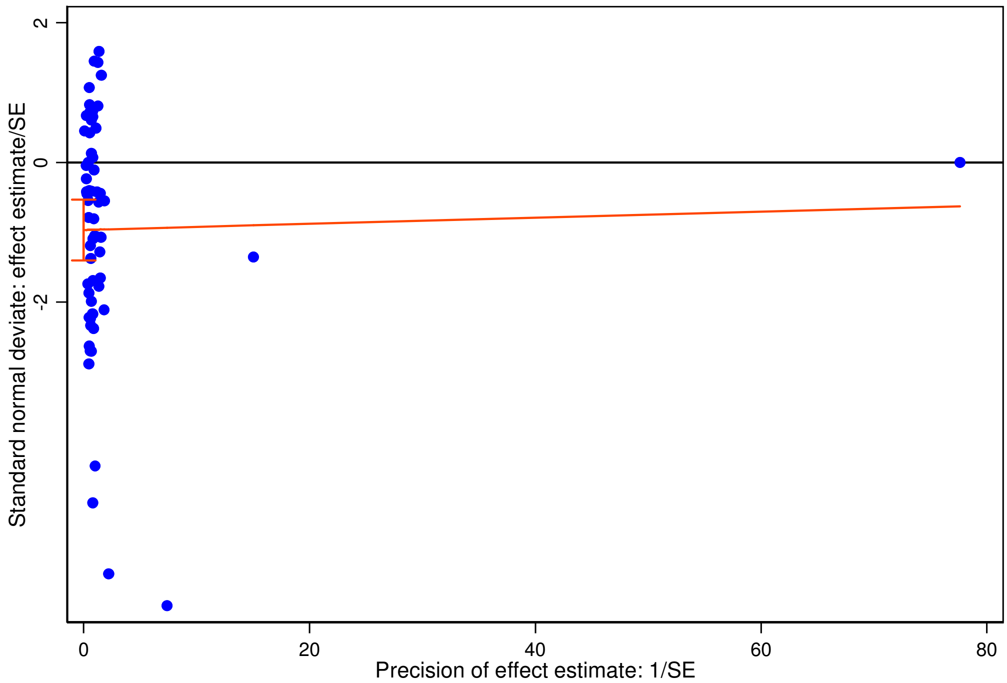
Supplementary Figure 30 Overall estimate of probiotics effect on glycated haemoglobin.



Supplementary Figure 31 Funnel plot, fasting insulin.



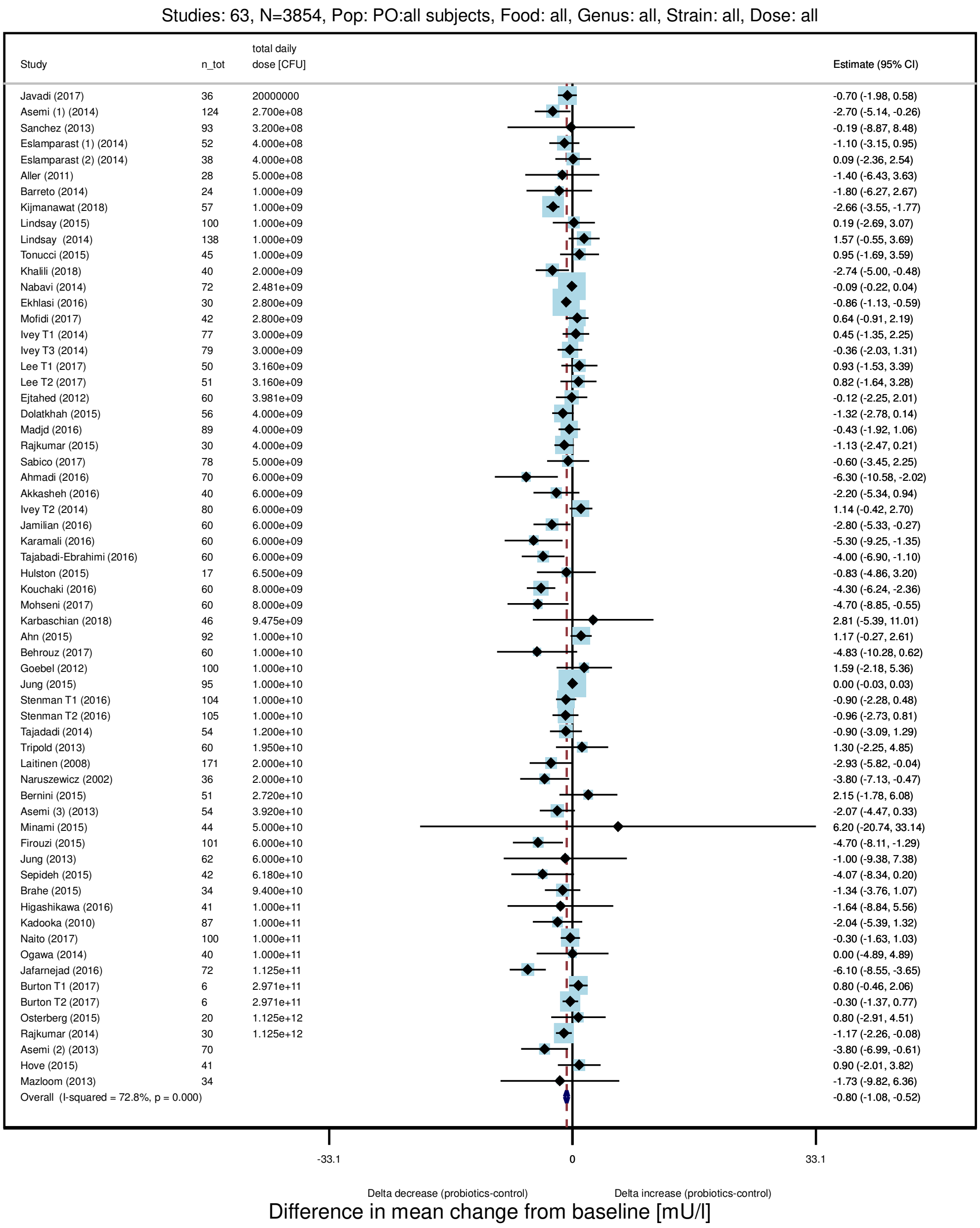
Supplementary Figure 32 Galbraith's plot for small study effects, fasting insulin.



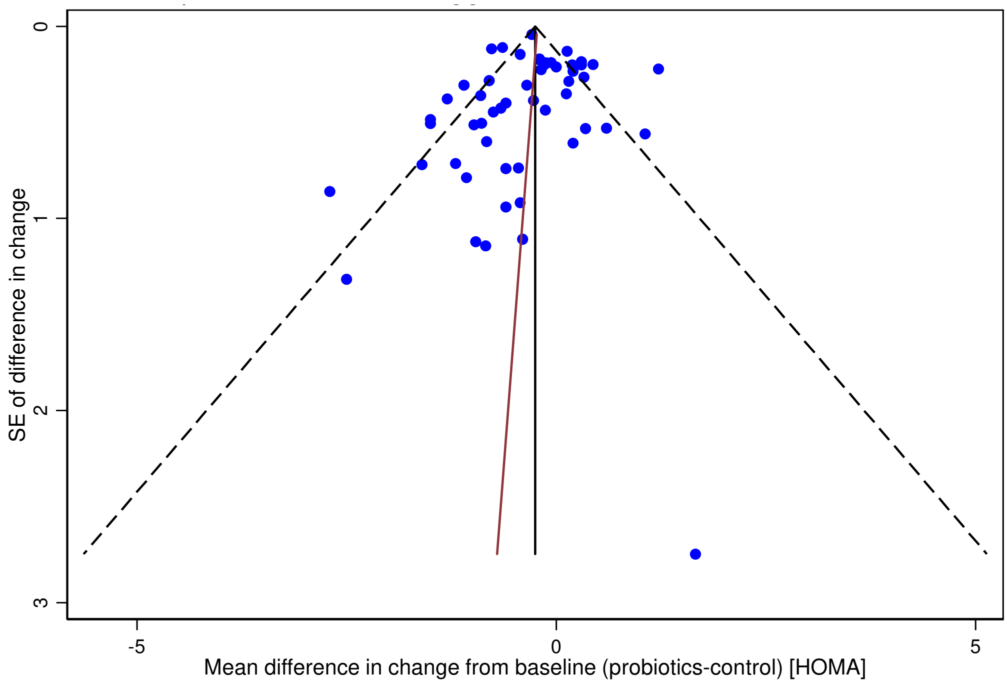
Legend Figure 32:

Hypothesis tests for small study effects: Egger's test: bias coefficient=-0.97, P<0.001. Begg's test: adj. Kendall's score=56, P=0.740. Filled & trim meta analysis estimators: -0.800 (95%CI: -1.09 to -0.52), P<0.001, no studies filled or excluded.

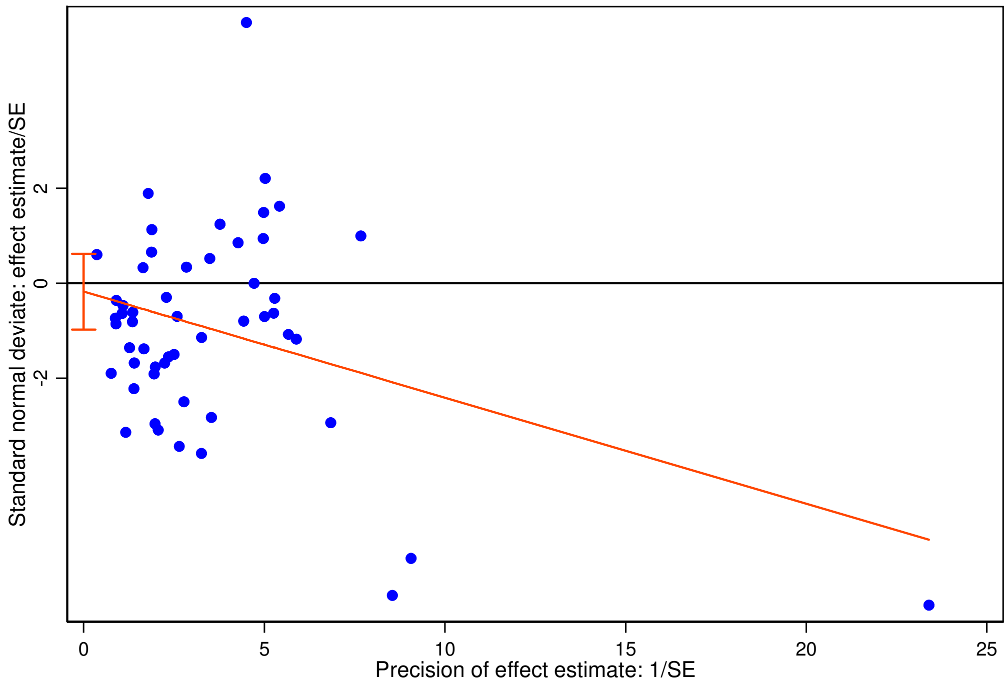
Supplementary Figure 33 Overall estimate of probiotics effect on fasting insulin.



Supplementary Figure 34 Funnel plot, homeostasis model of insulin resistance.



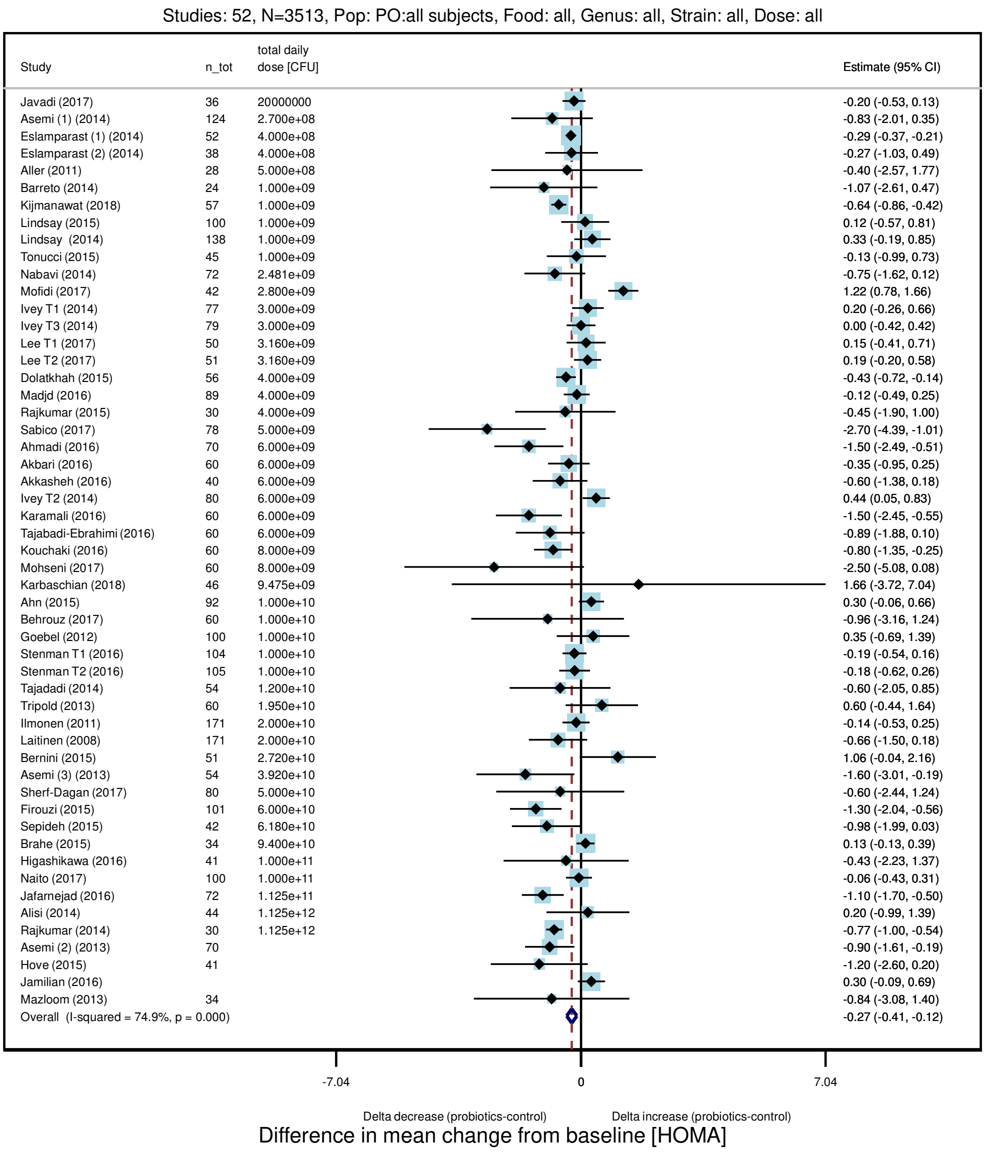
Supplementary Figure 35 Galbraith's plot for small study effects, homeostasis model of insulin resistance.



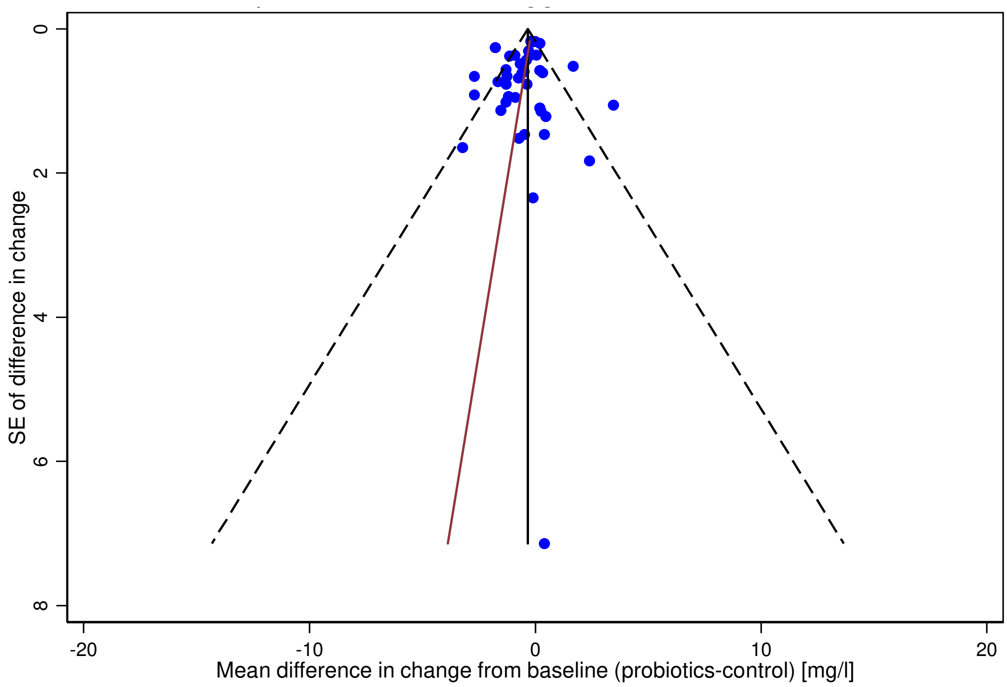
Legend Figure 35:

Hypothesis tests for small study effects: Egger's test: bias coefficient=-0.18, P=0.662. Begg's test: adj. Kendall's score=-226, P=0.083.

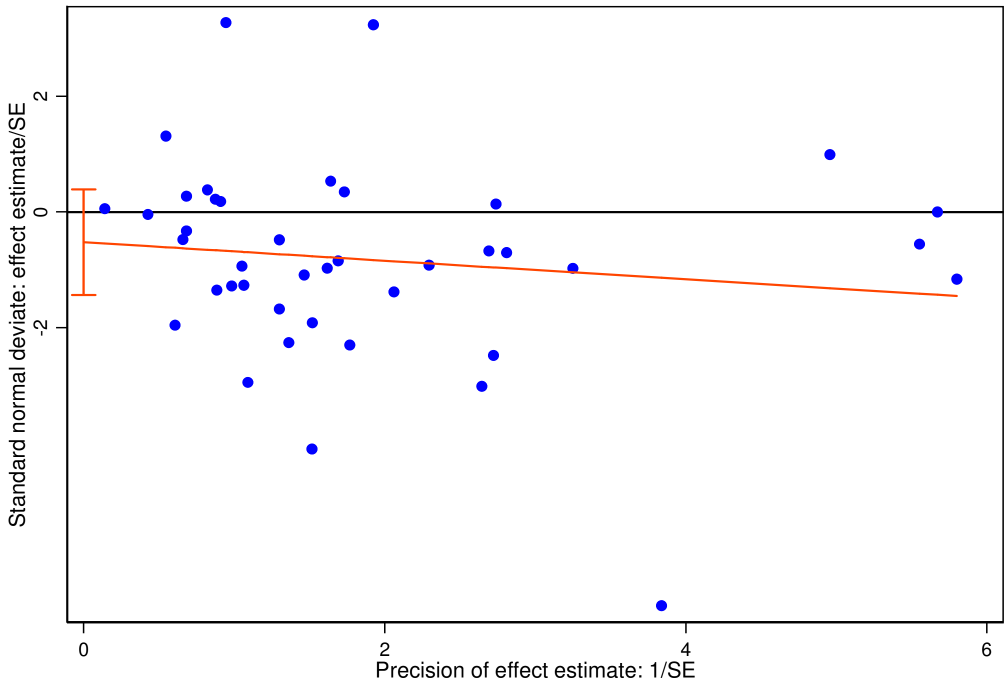
Supplementary Figure 36 Overall estimate of probiotics effect on homeostasis model of insulin resistance.



Supplementary Figure 37 Funnel plot, C-reactive protein.



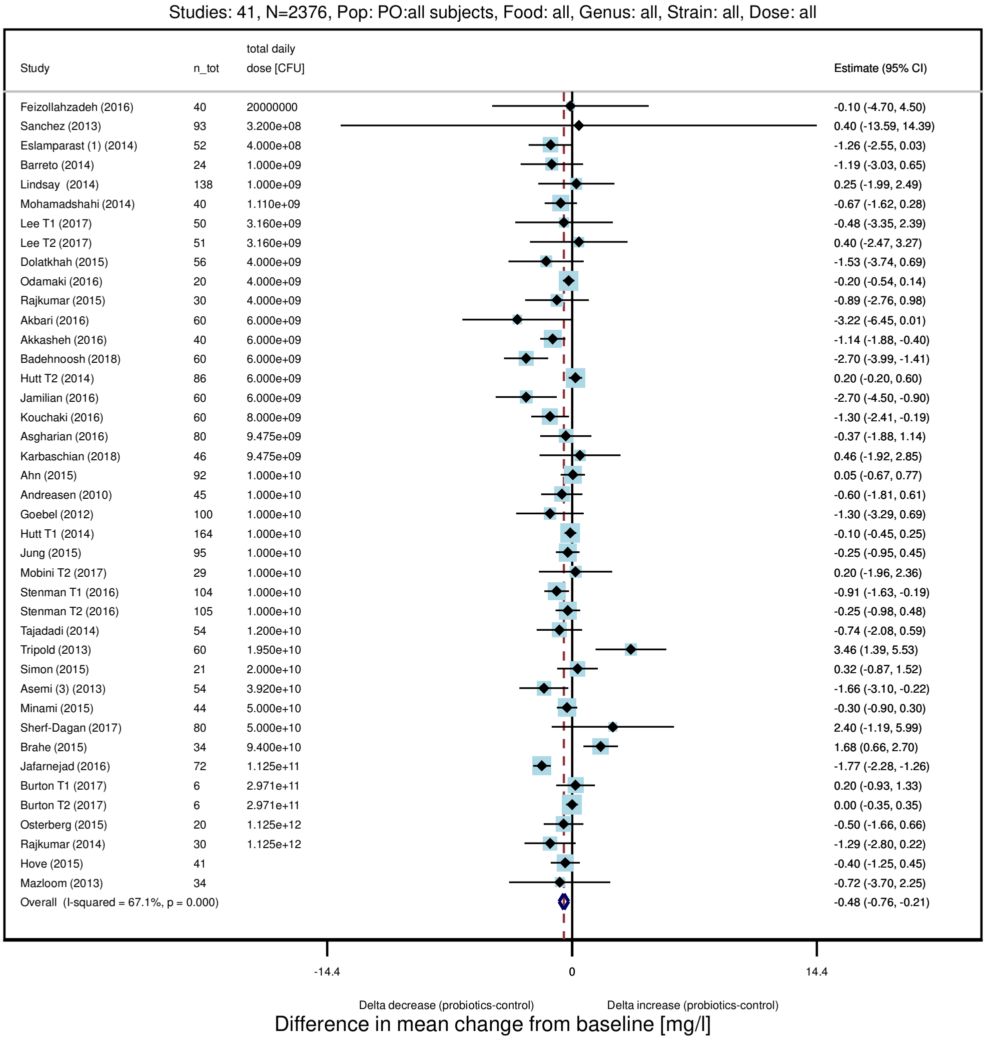
Supplementary Figure 38 Galbraith's plot for small study effects, C-reactive protein.



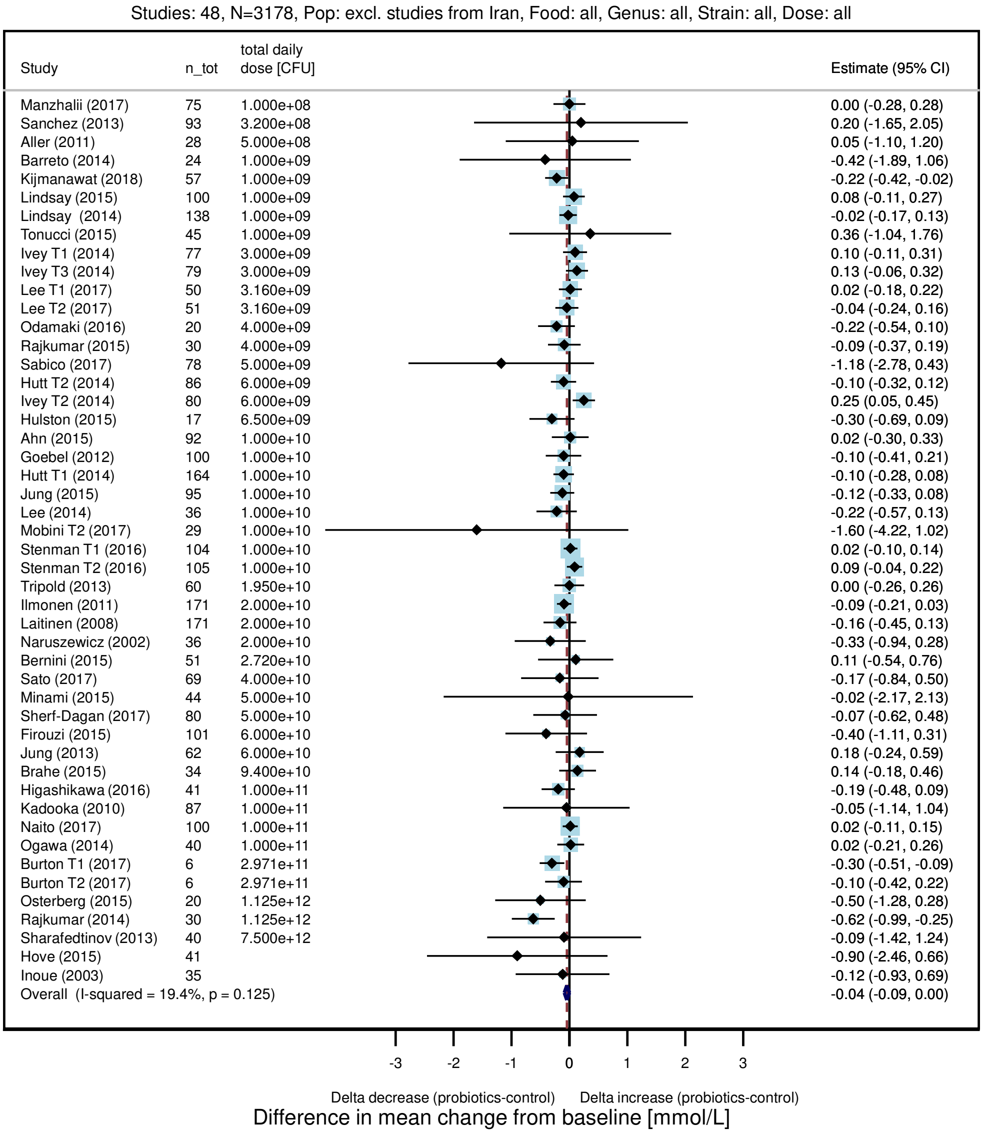
Legend Figure 38:

Hypothesis tests for small study effects: Egger's test: bias coefficient=-0.52, P=0.255. Begg's test: adj. Kendall's score=-51, P=0.567.

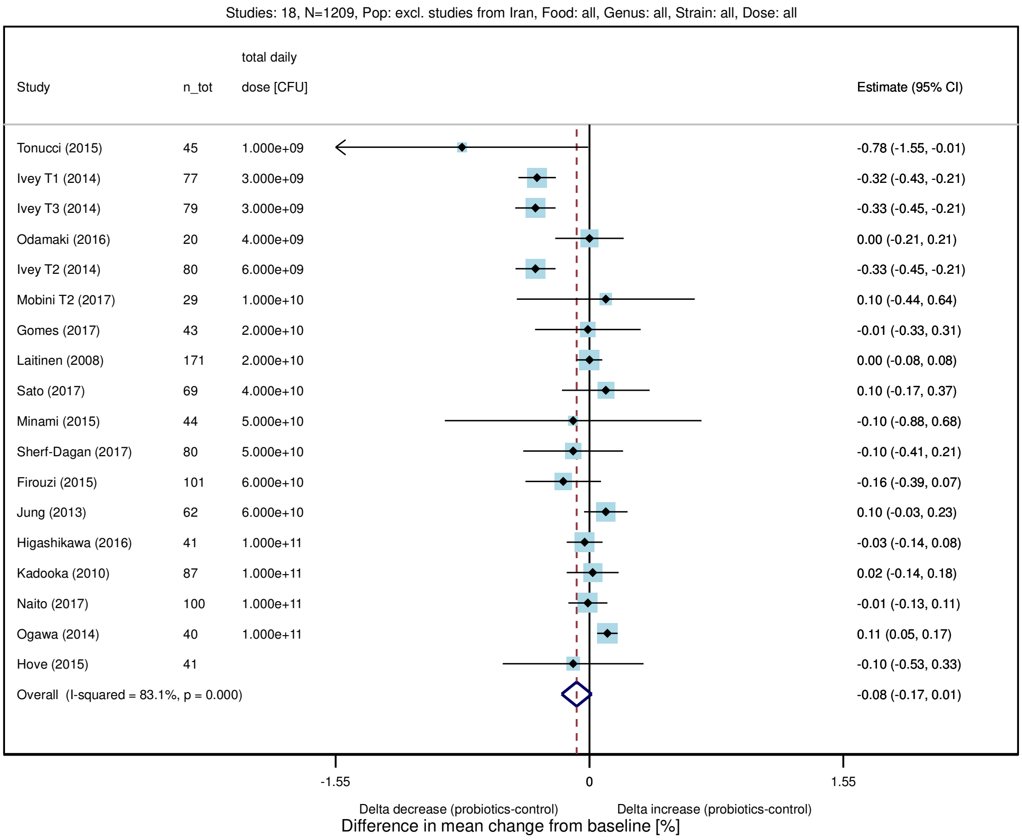
Supplementary Figure 39 Overall estimate of probiotics effect on C-reactive protein.



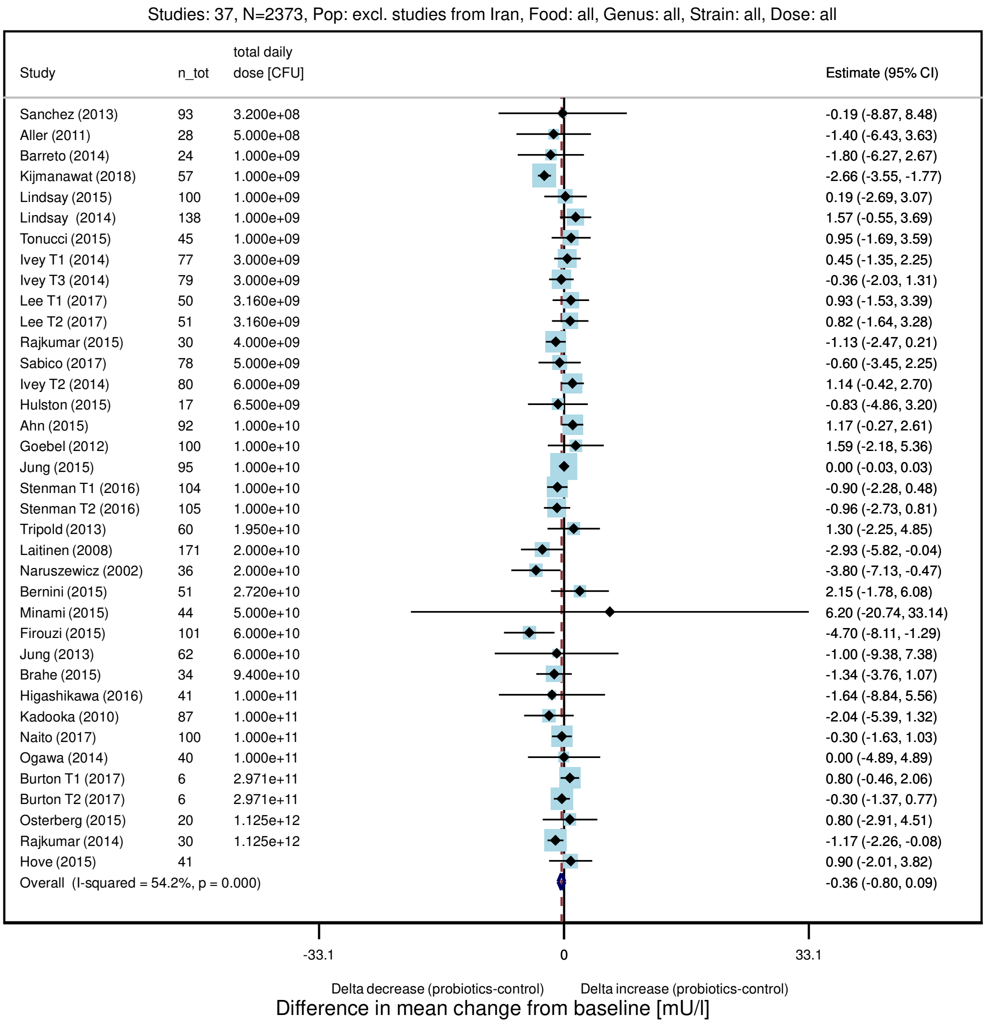
Supplementary Figure 40 Estimate of probiotics effect on fasting glucose excluding studies conducted in Iran.



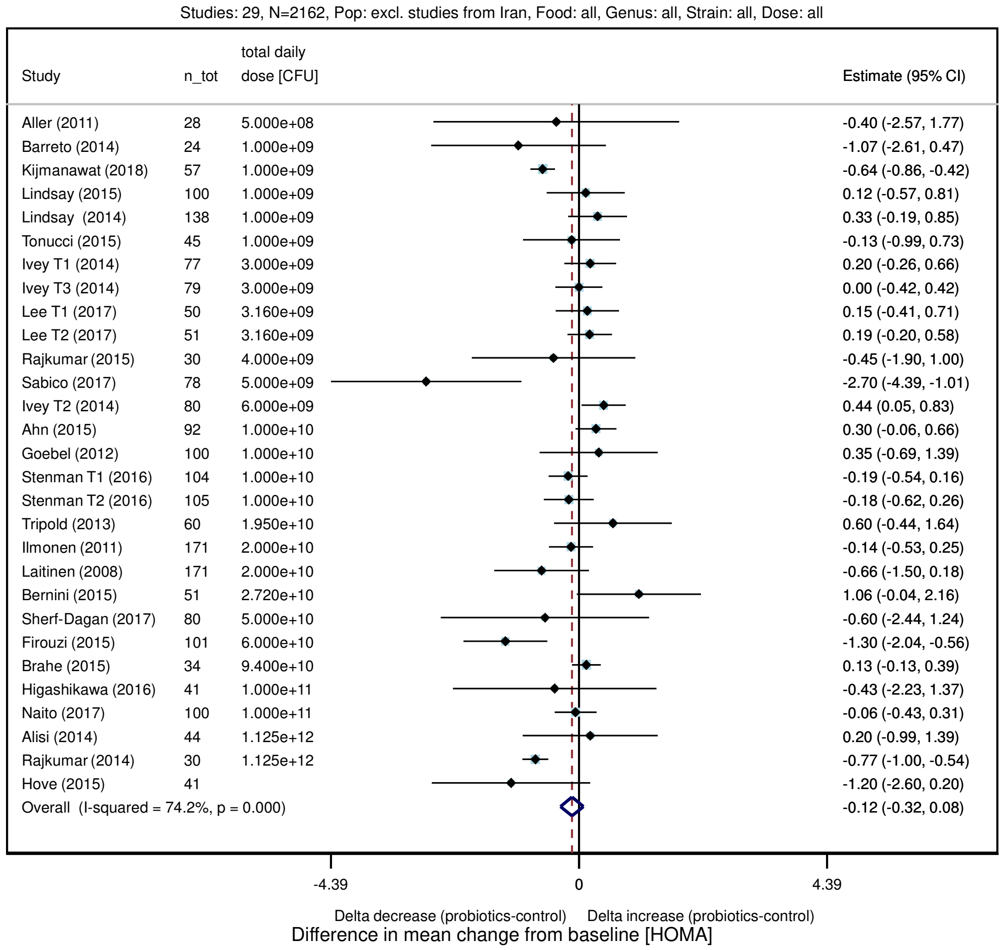
Supplementary Figure 41 Estimate of probiotics effect on glycated haemoglobin excluding studies conducted in Iran.



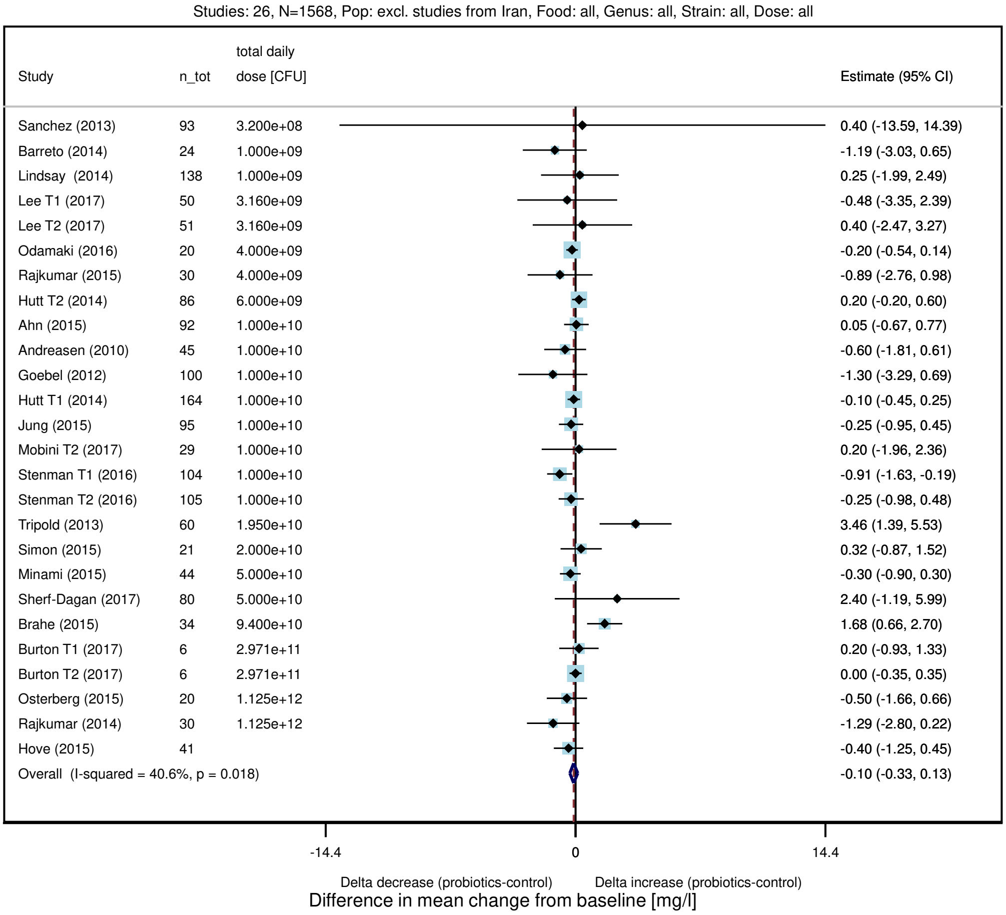
Supplementary Figure 42 Estimate of probiotics effect on fasting insulin excluding studies conducted in Iran.



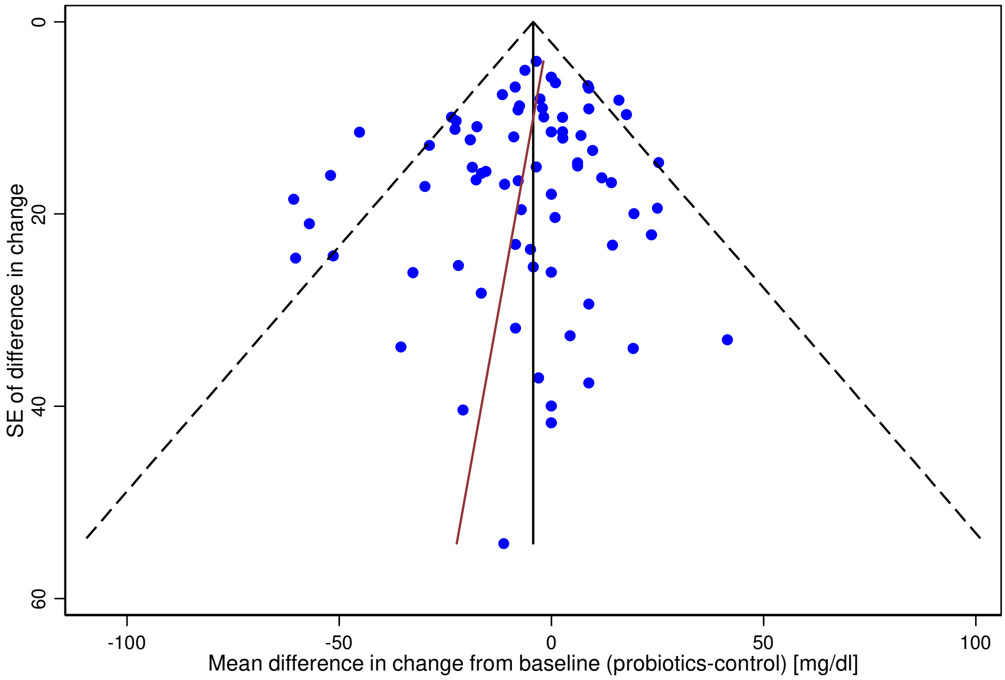
Supplementary Figure 43 Estimate of probiotics effect on homeostasis model of insulin resistance excluding studies conducted in Iran.



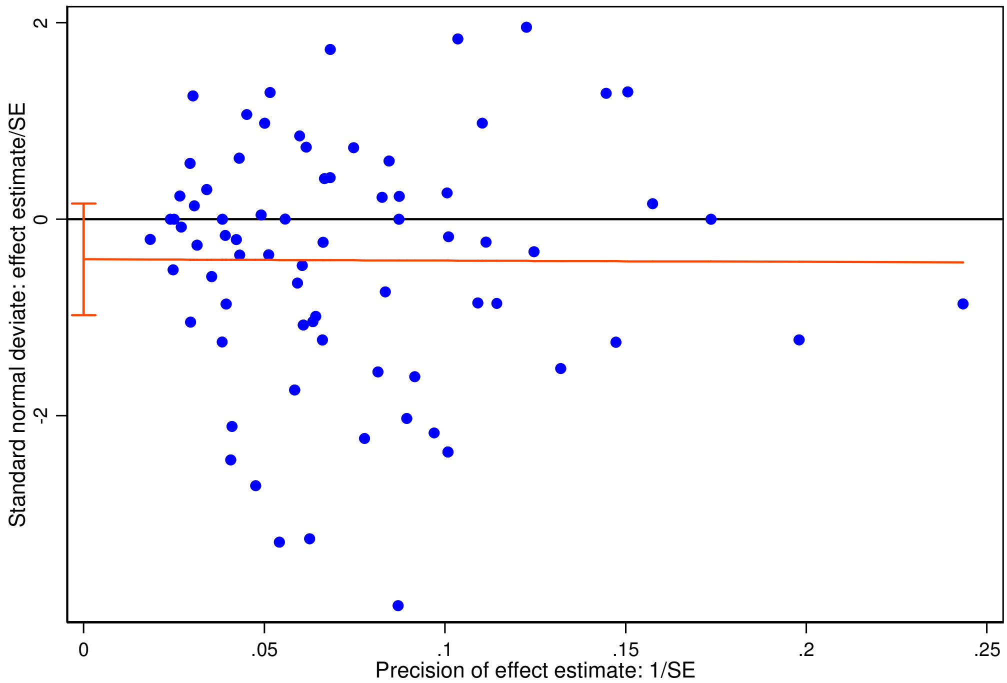
Supplementary Figure 44 Estimate of probiotics effect on C-reactive protein excluding studies conducted in Iran.



Supplementary Figure 45 Funnel plot, triglycerides.



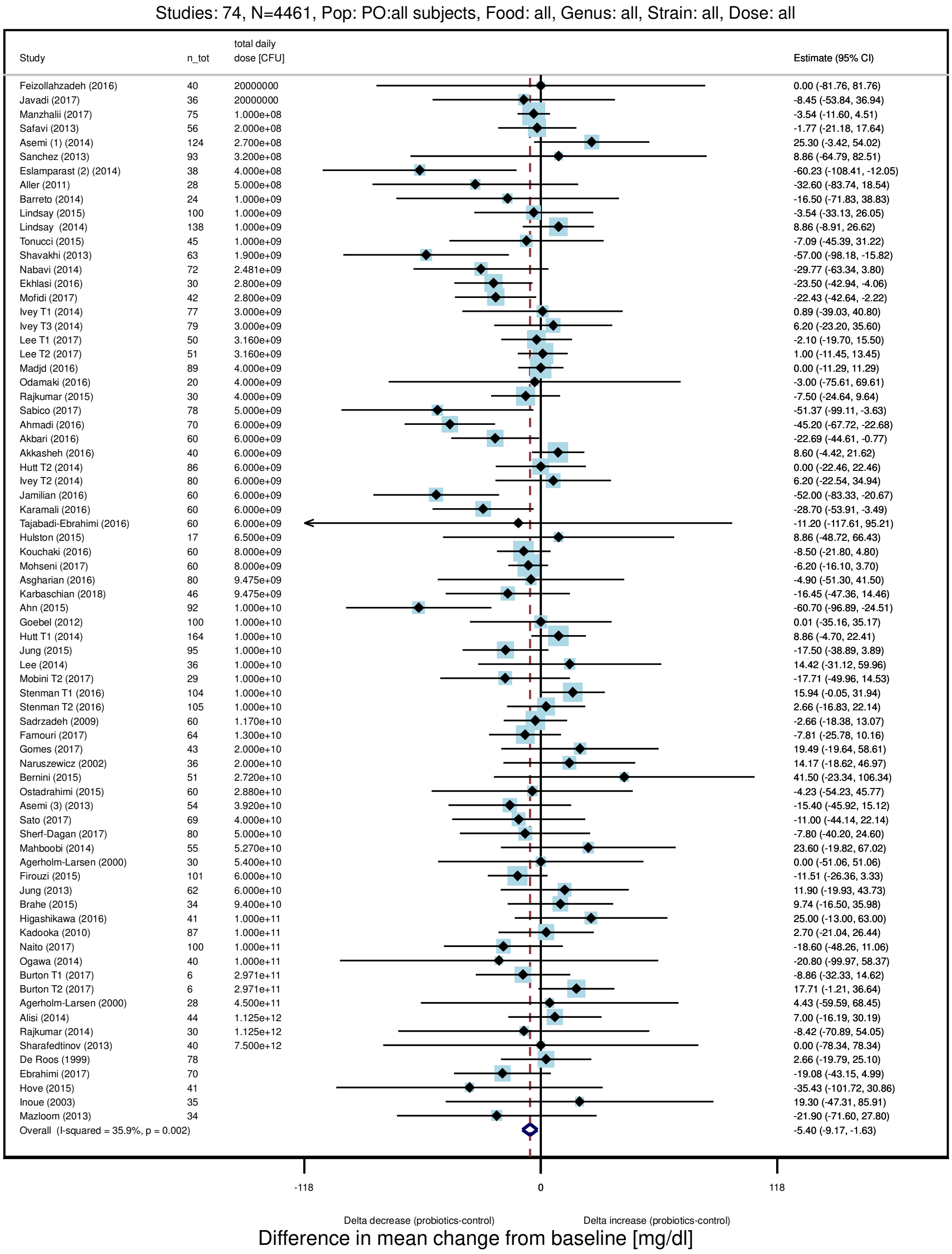
Supplementary Figure 46 Galbraith's plot for small study effects, triglycerides.



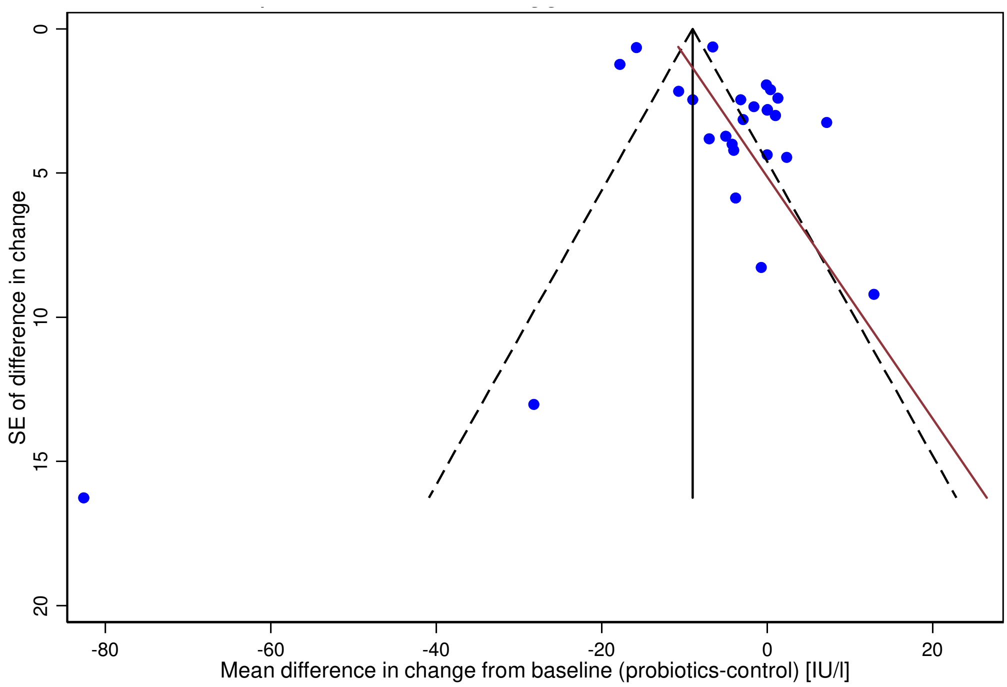
Legend Figure 46:

Hypothesis tests for small study effects: Egger's test: bias coefficient=-0.41, P=0.157. Begg's test: adj. Kendall's score=-177, P=0.409.

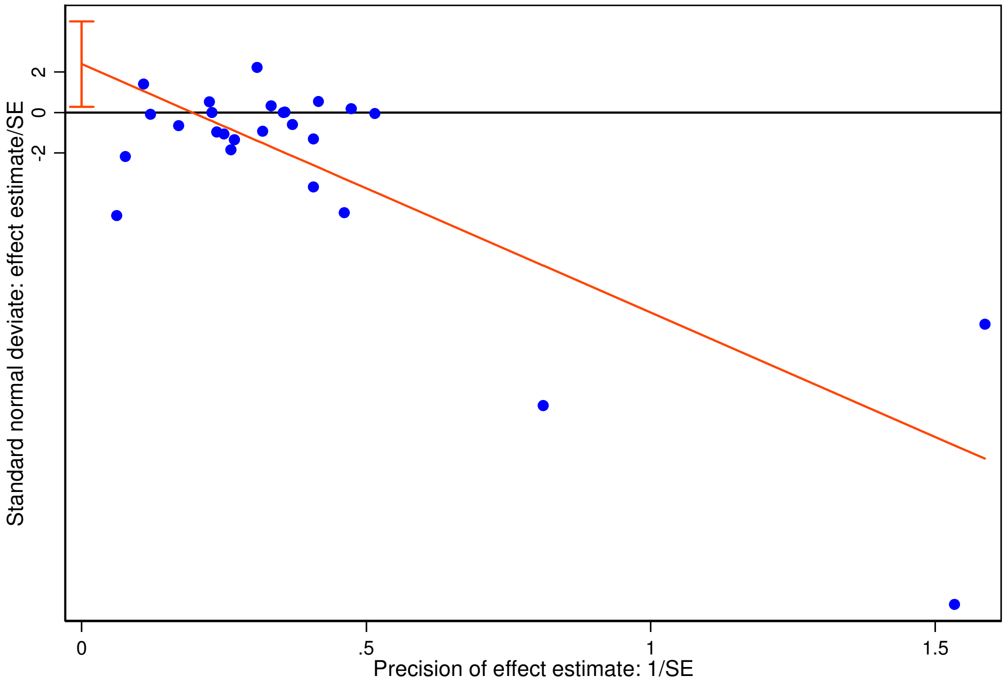
Supplementary Figure 47 Overall estimate of probiotics effect on triglycerides.



Supplementary Figure 48 Funnel plot, alanine aminotransferase.



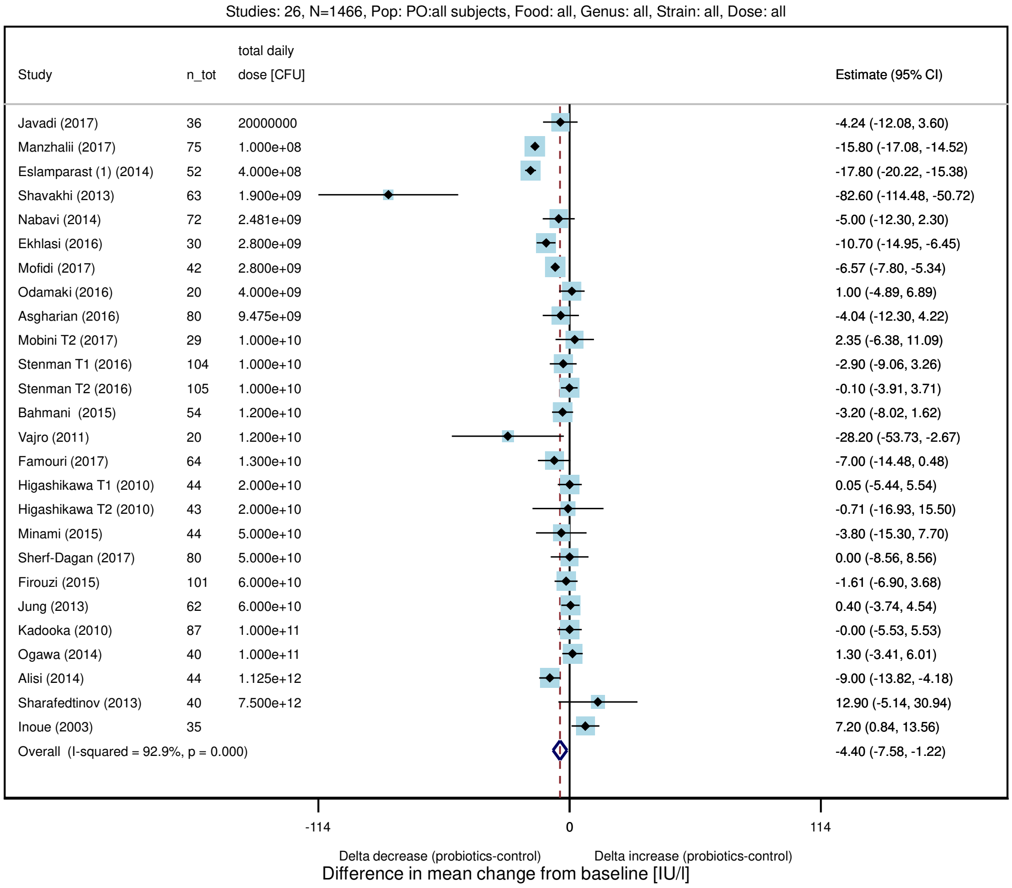
Supplementary Figure 49 Galbraith's plot for small study effects, alanine aminotransferase.



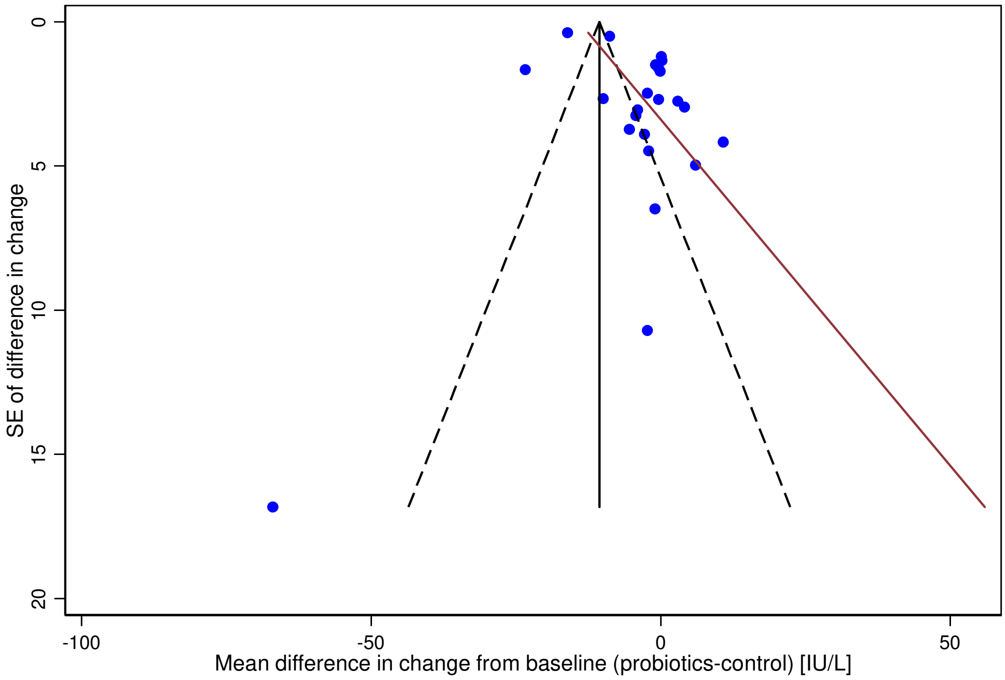
Legend Figure 49:

Hypothesis tests for small study effects: Egger's test: bias coefficient=2.39, P=0.028. Begg's test: adj. Kendall's score=-72, P=0.112. Filled & trim meta analysis estimator: -6.28 (95%CI: -9.16 to -3.40), P<0.001, 5 studies filled.

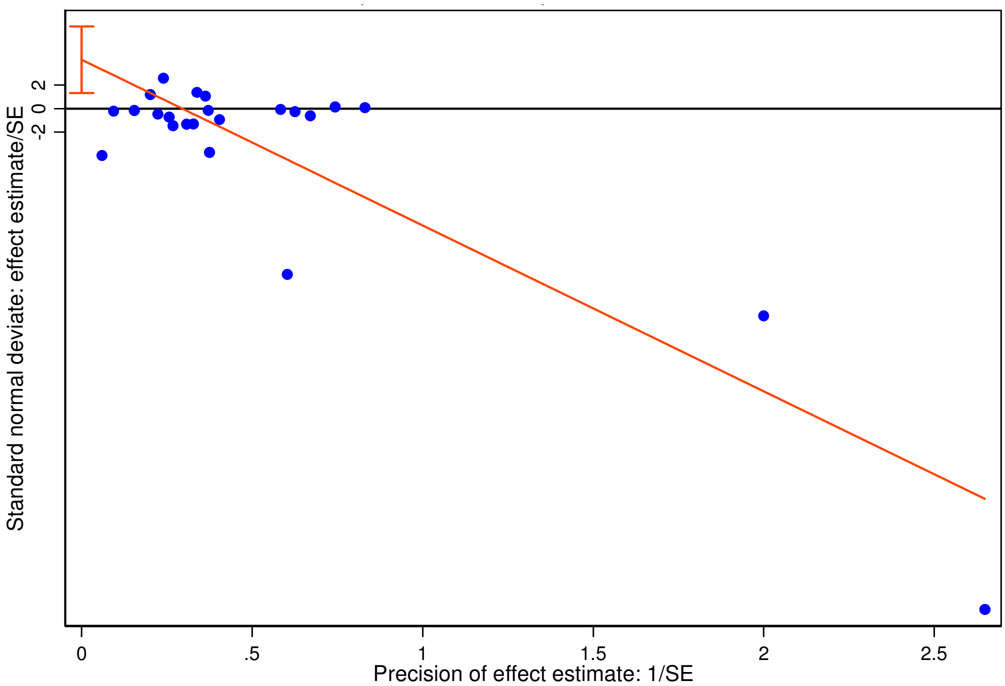
Supplementary Figure 50 Overall estimate of probiotics effect on alanine aminotransferase.



Supplementary Figure 51 Funnel plot, aspartate aminotransferase.



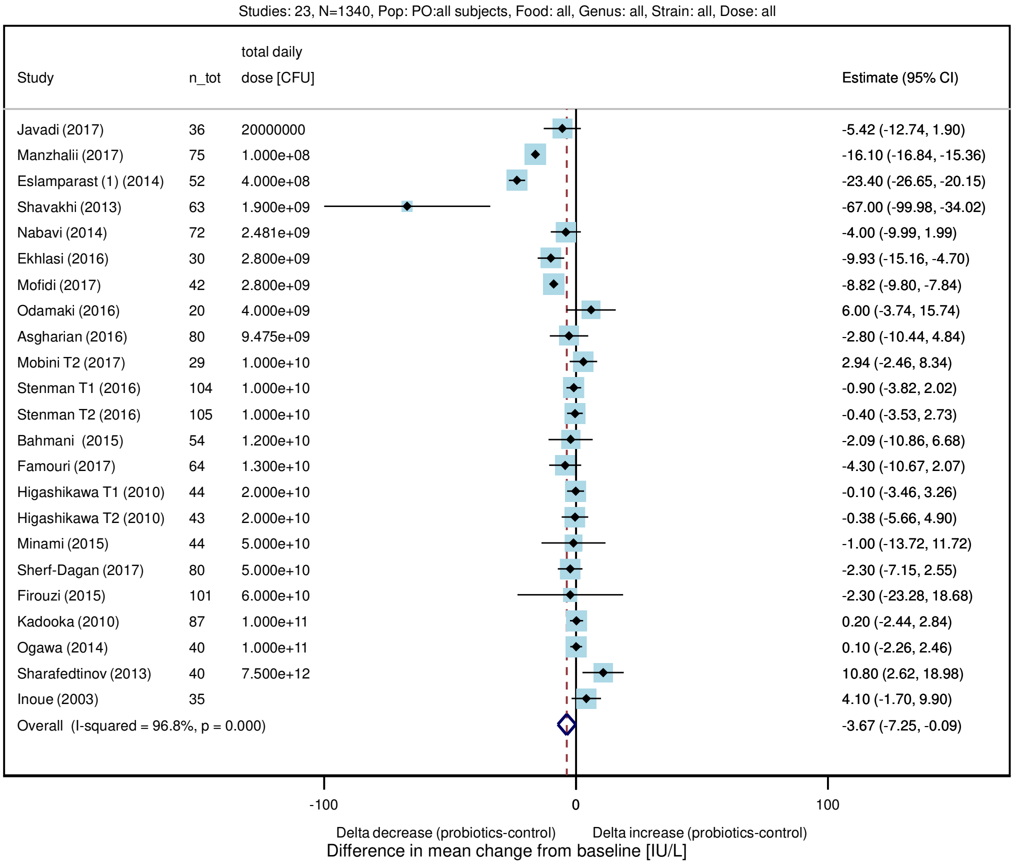
Supplementary Figure 52 Galbraith's plot for small study effects, aspartate aminotransferase.



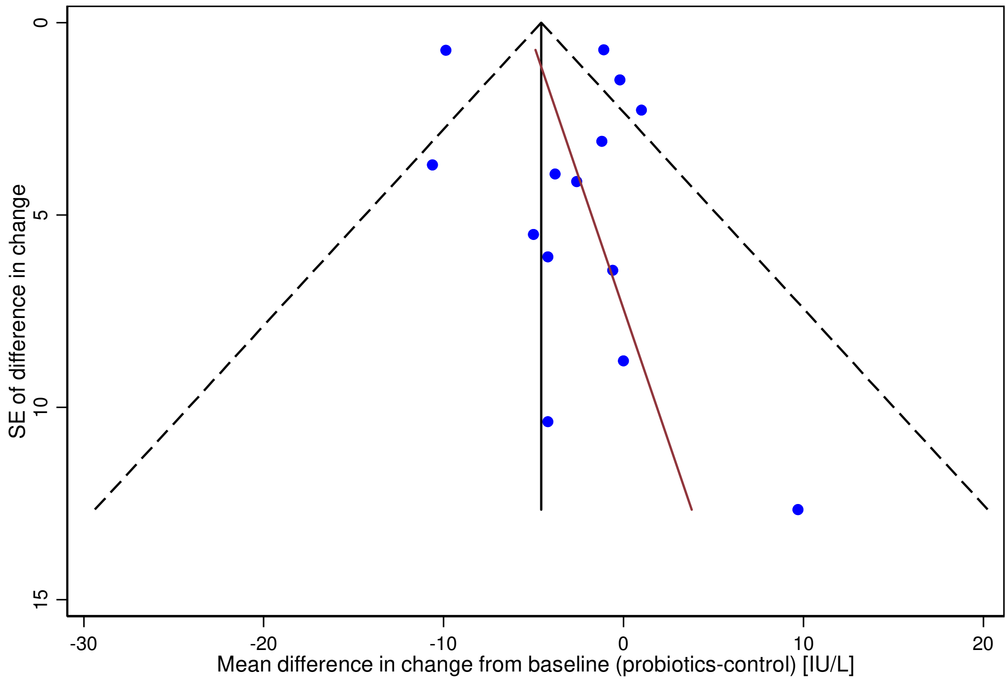
Legend Figure 52:

Hypothesis tests for small study effects: Egger's test: bias coefficient=-4.17, P=0.006. Begg's test: adj. Kendall's score=-91, P=0.016. Filled & trim meta analysis estimators: -5.99 (95%CI: -9.12 to -2.87), P<0.001, 5 studies filled.

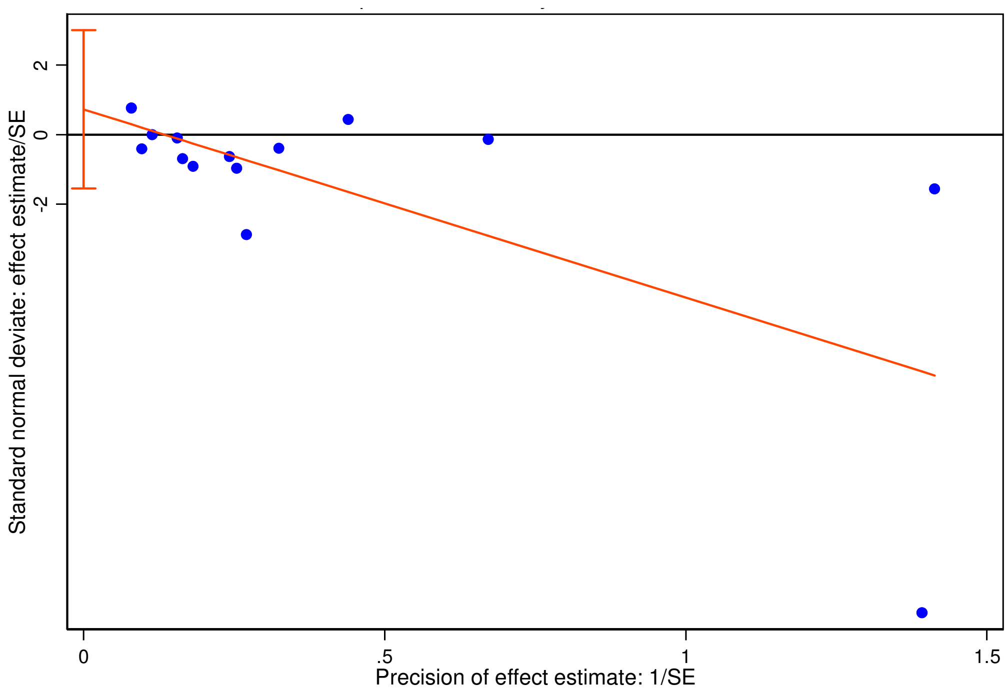
Supplementary Figure 53 Overall estimate of probiotics effect on aspartate aminotransferase.



Supplementary Figure 54 Funnel plot, gamma-glutamyl aminotransferase.



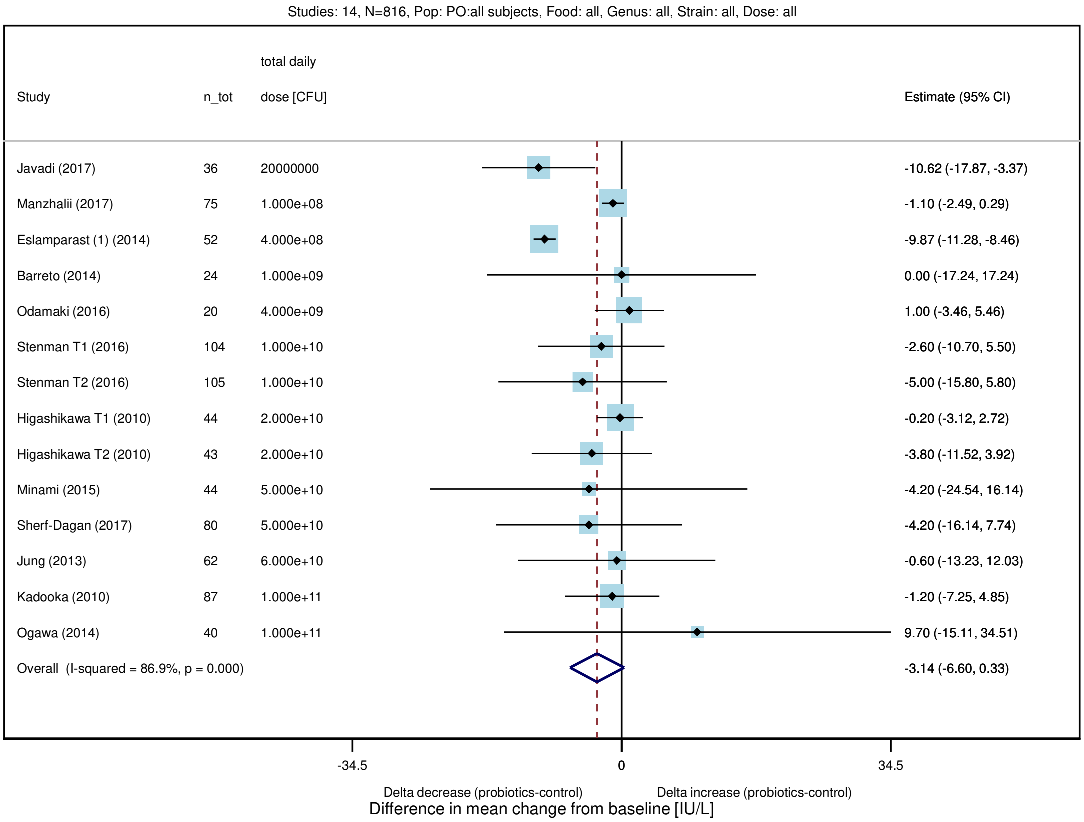
Supplementary Figure 55 Galbraith's plot for small study effects, gamma-glutamyl aminotransferase.



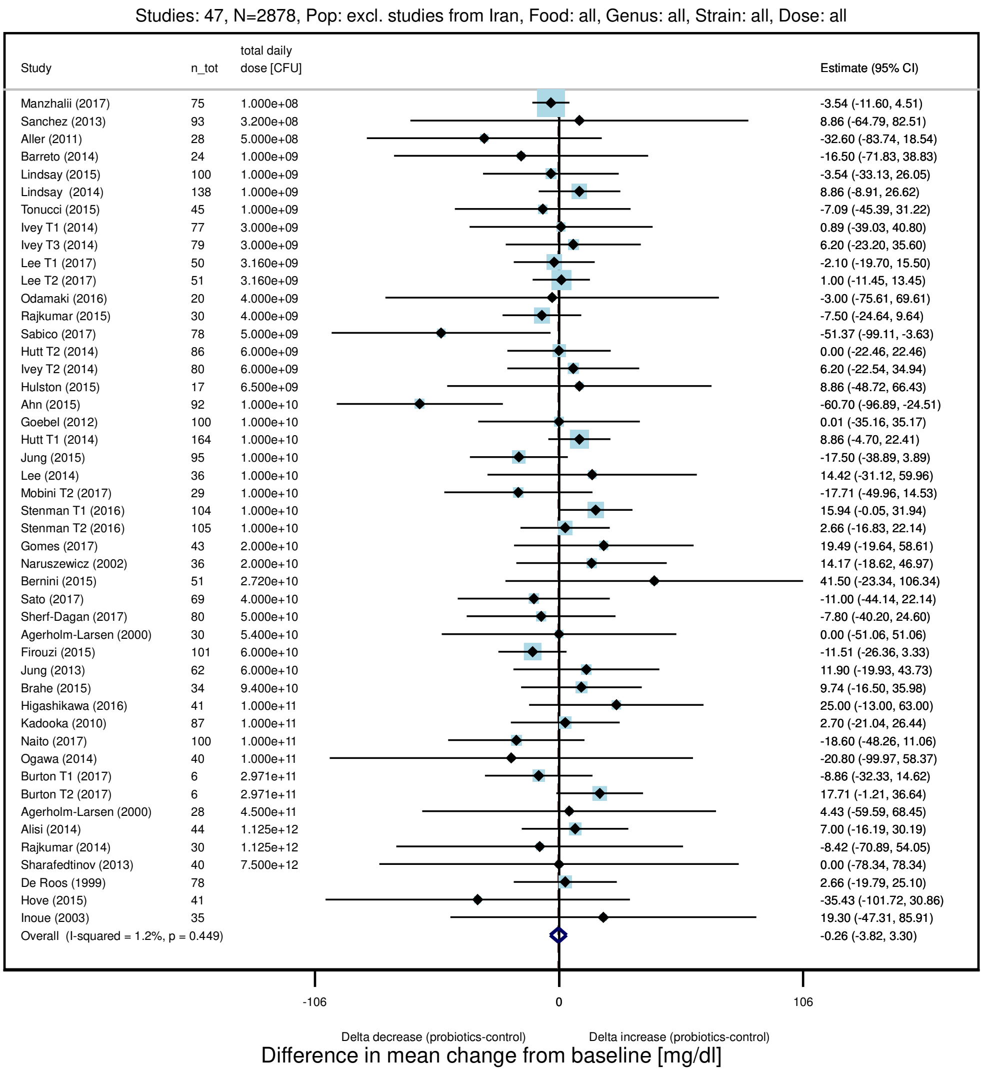
Legend Figure 55:

Hypothesis tests for small study effects: Egger's test: bias coefficient=0.73, P=0.500. Begg's test: adj. Kendall's score=-13, P=0.477.

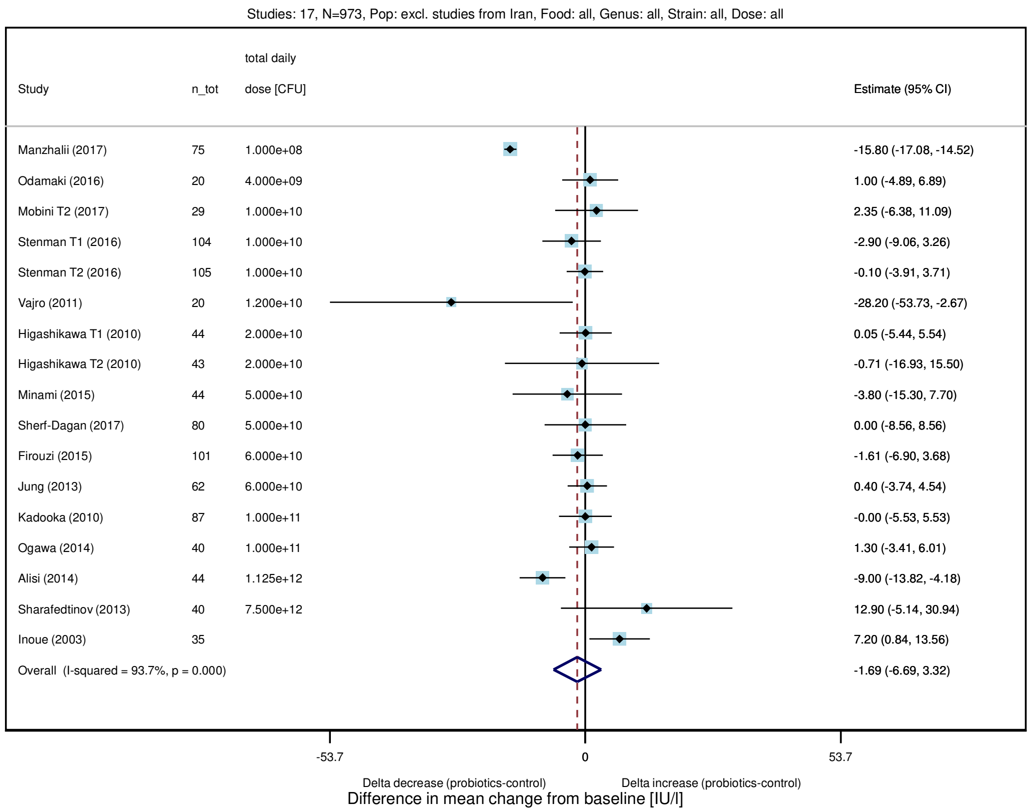
Supplementary Figure 56 Overall estimate of probiotics on gamma-glutamyl aminotransferase.



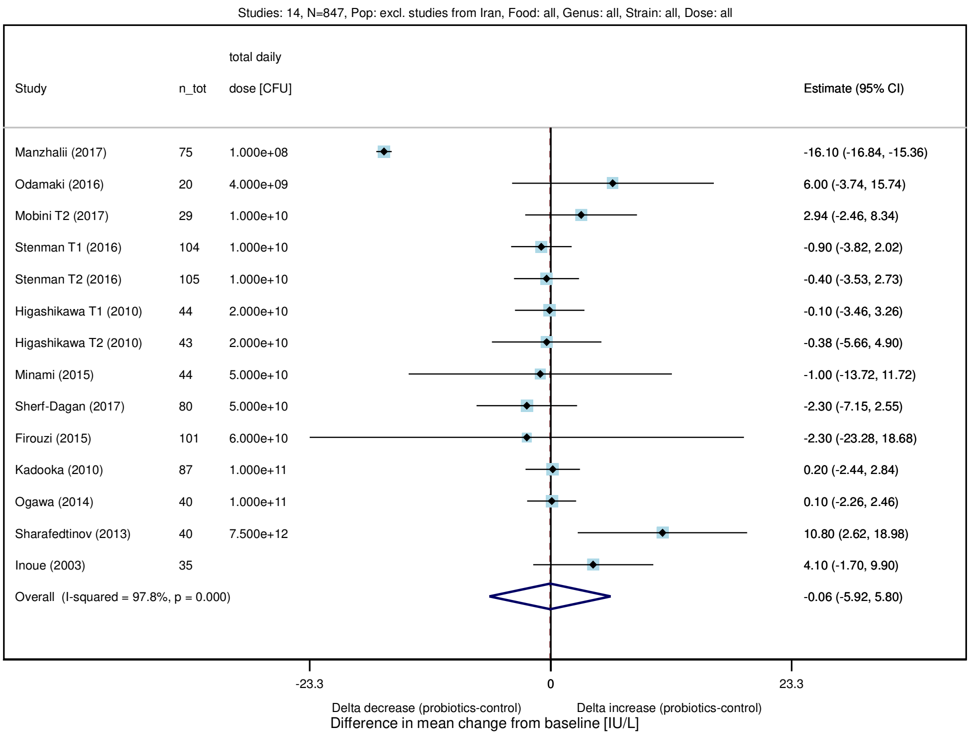
Supplementary Figure 57 Estimate of probiotics effect on triglycerides excluding studies conducted in Iran.



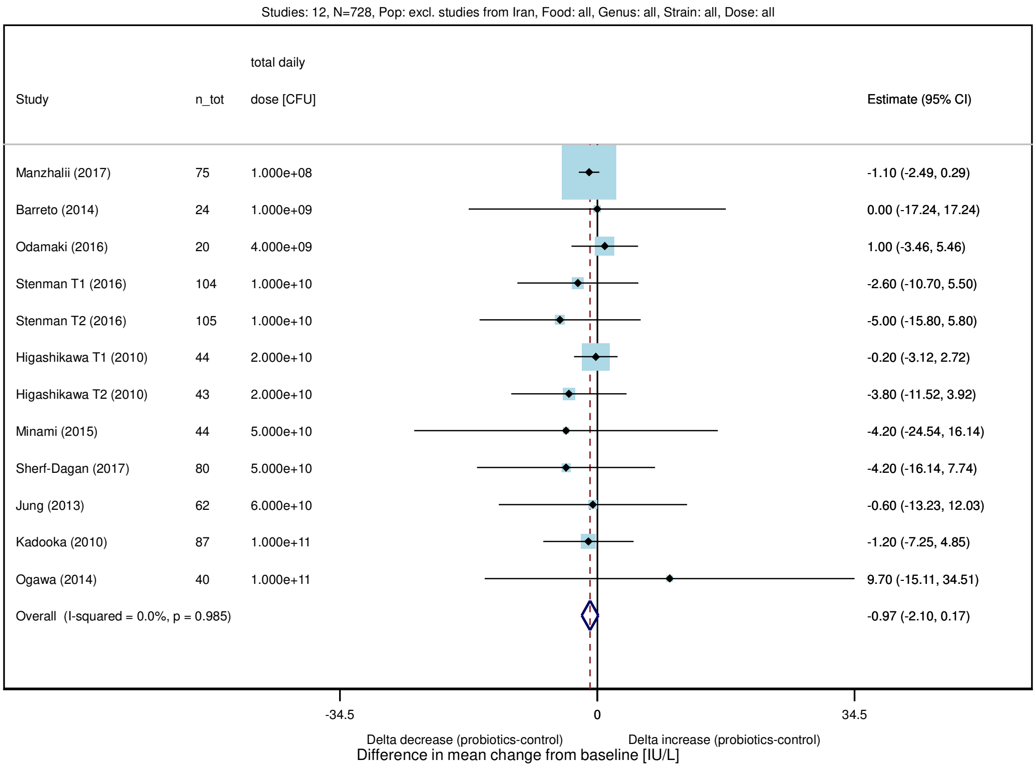
Supplementary Figure 58 Estimate of probiotics effect on alanine aminotransferase excluding studies conducted in Iran.



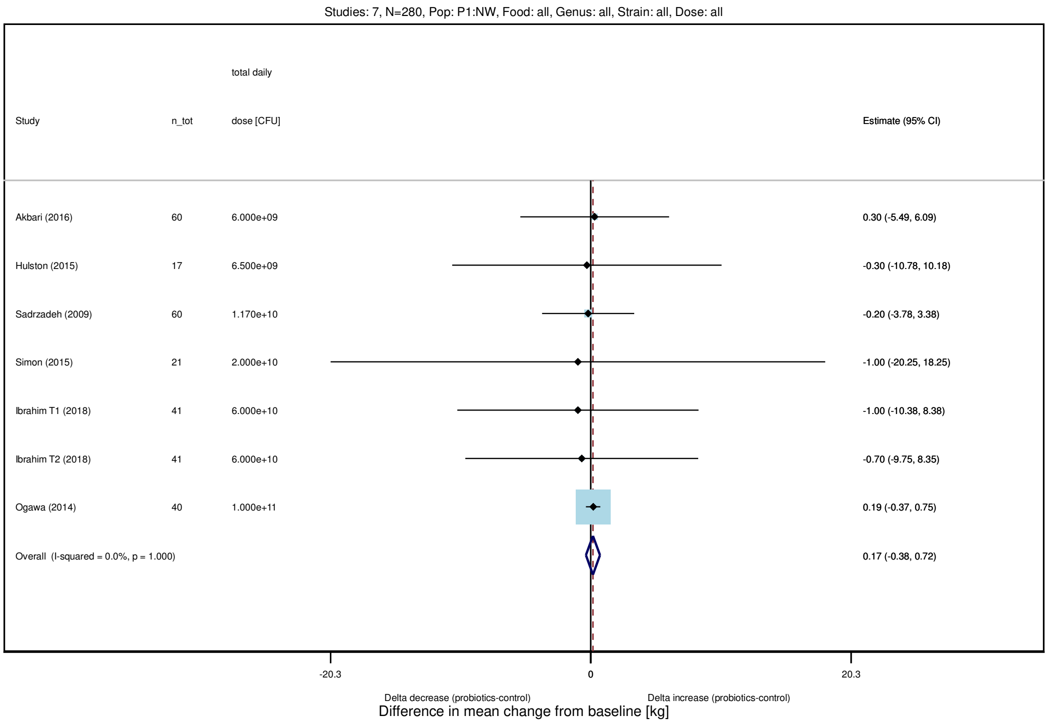
Supplementary Figure 59 Estimate of probiotics effect on aspartate aminotransferase excluding studies conducted in Iran.



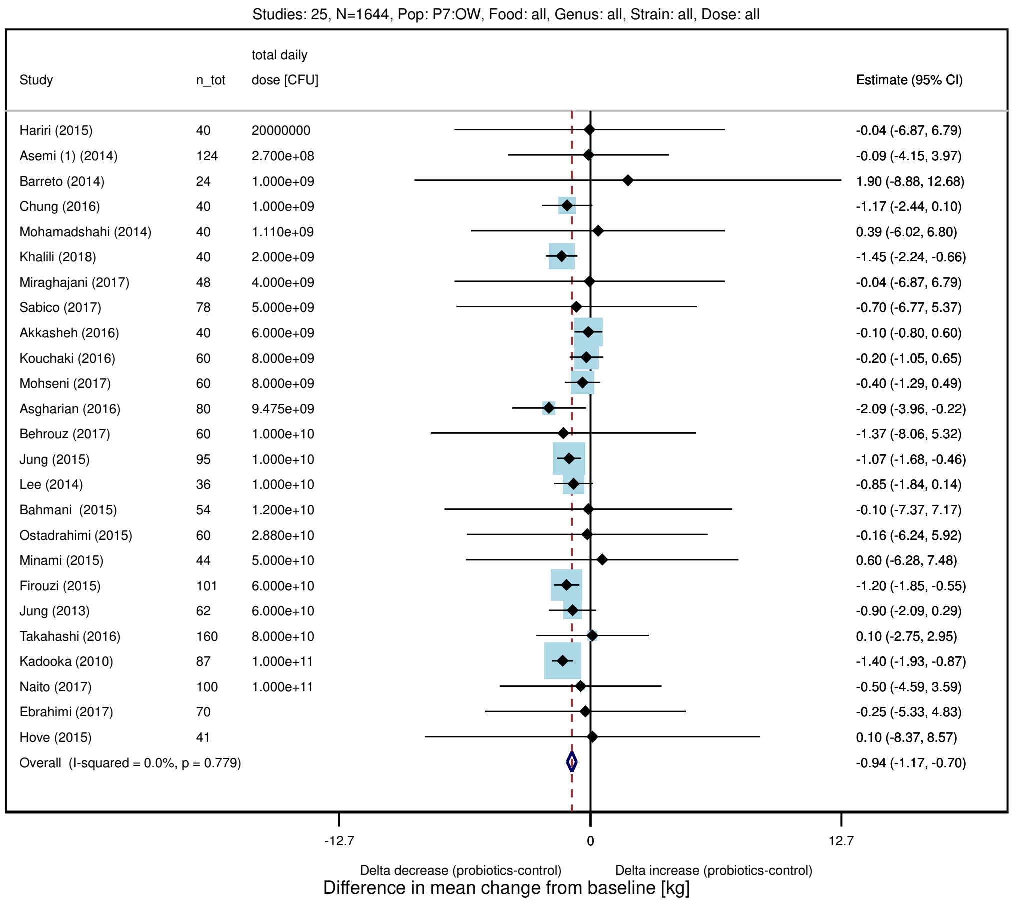
Supplementary Figure 60 Estimate of probiotics effect on gamma-glutamyl aminotransferase excluding studies conducted in Iran.



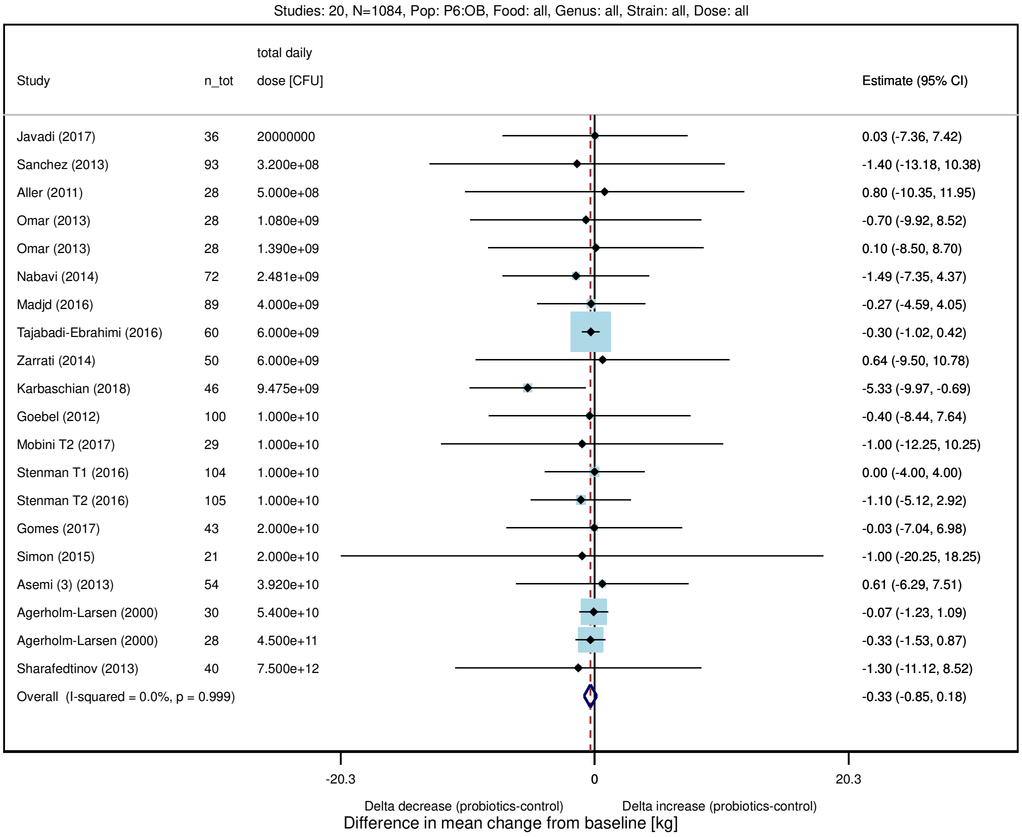
Supplementary Figure 61 Estimate of probiotics effect on body weight. Subgroup analysis in normal weight subjects.



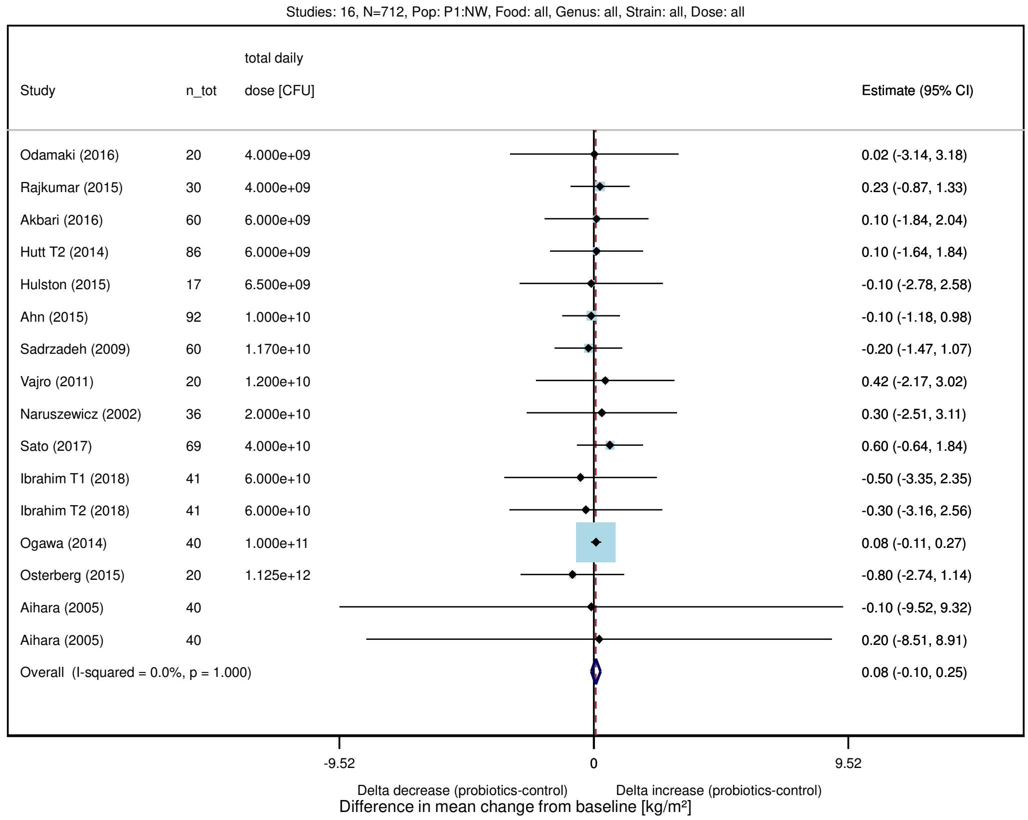
Supplementary Figure 62 Estimate of probiotics effect on body weight. Subgroup analysis in overweight subjects.



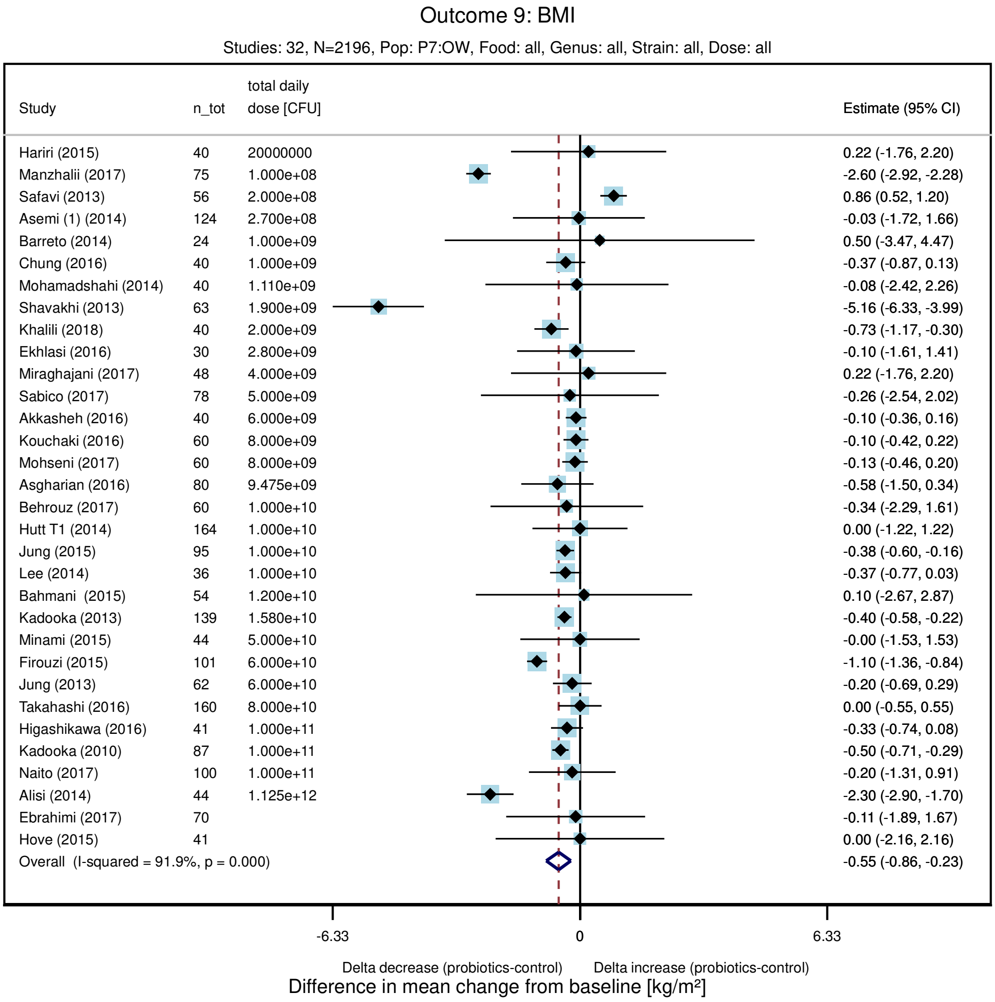
Supplementary Figure 63 Estimate of probiotics effect on body weight. Subgroup analysis in obese subjects.



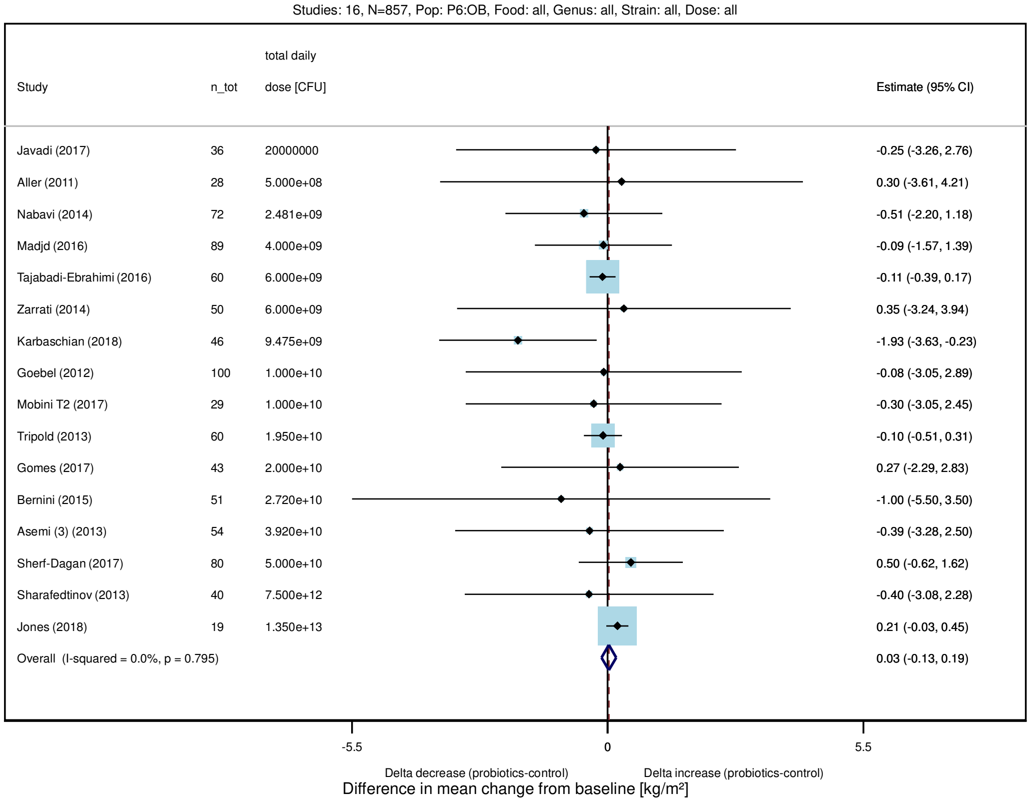
Supplementary Figure 64 Estimate of probiotics effect on body mass index. Subgroup analysis in normal weight subjects.



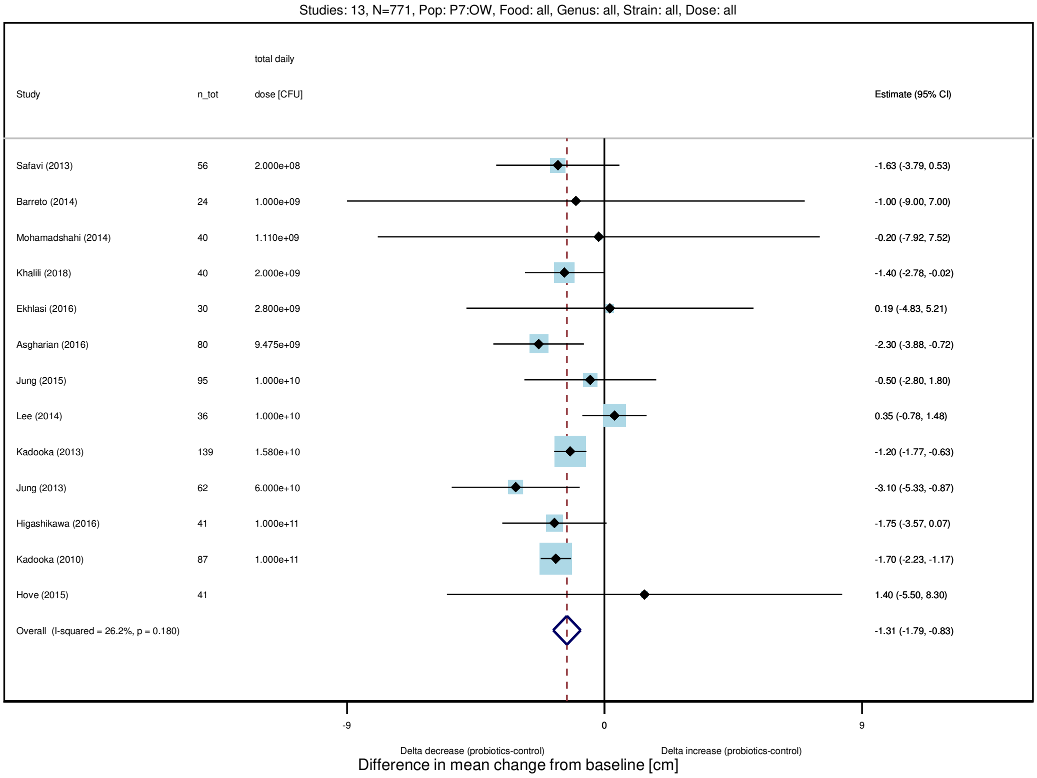
Supplementary Figure 65 Estimate of probiotics effect body mass index. Subgroup analysis in overweight subjects.



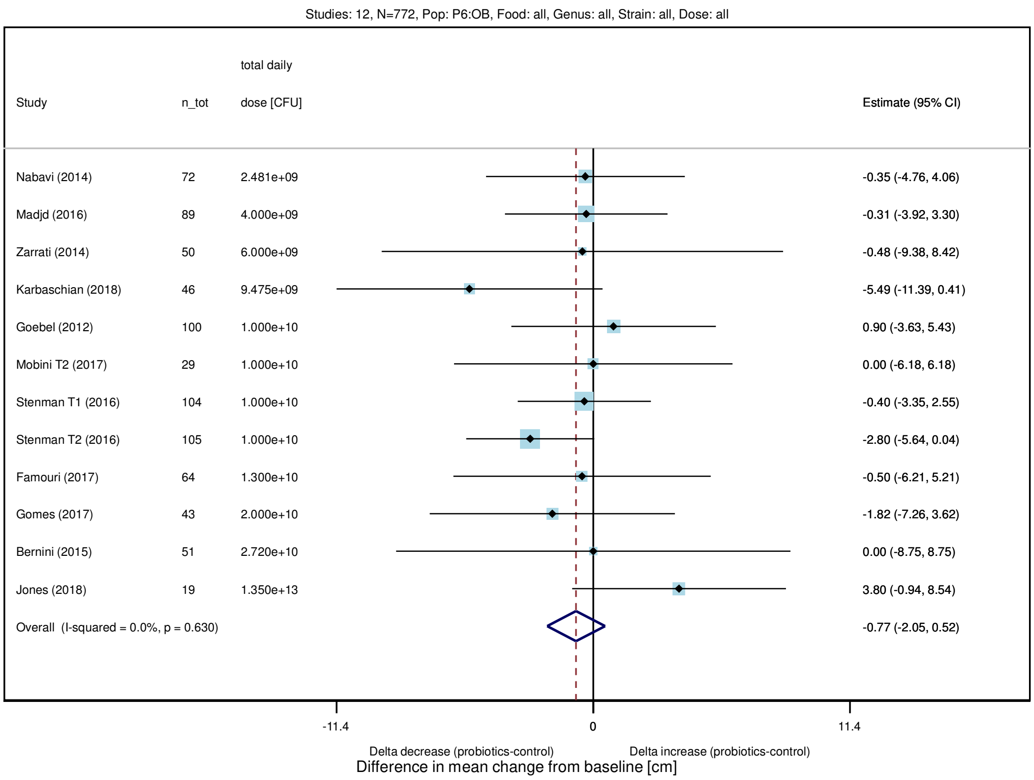
Supplementary Figure 66 Estimate of probiotics effect on body mass index. Subgroup analysis in obese subjects.



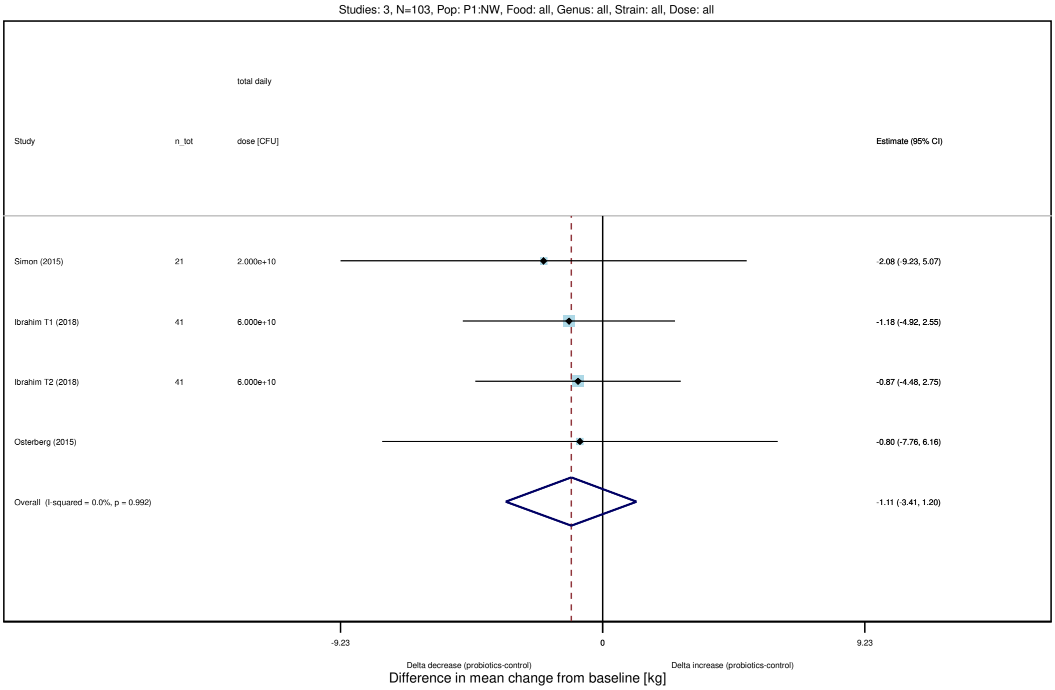
Supplementary Figure 67 Estimate of probiotics effect on waist circumference. Subgroup analysis in overweight subjects.



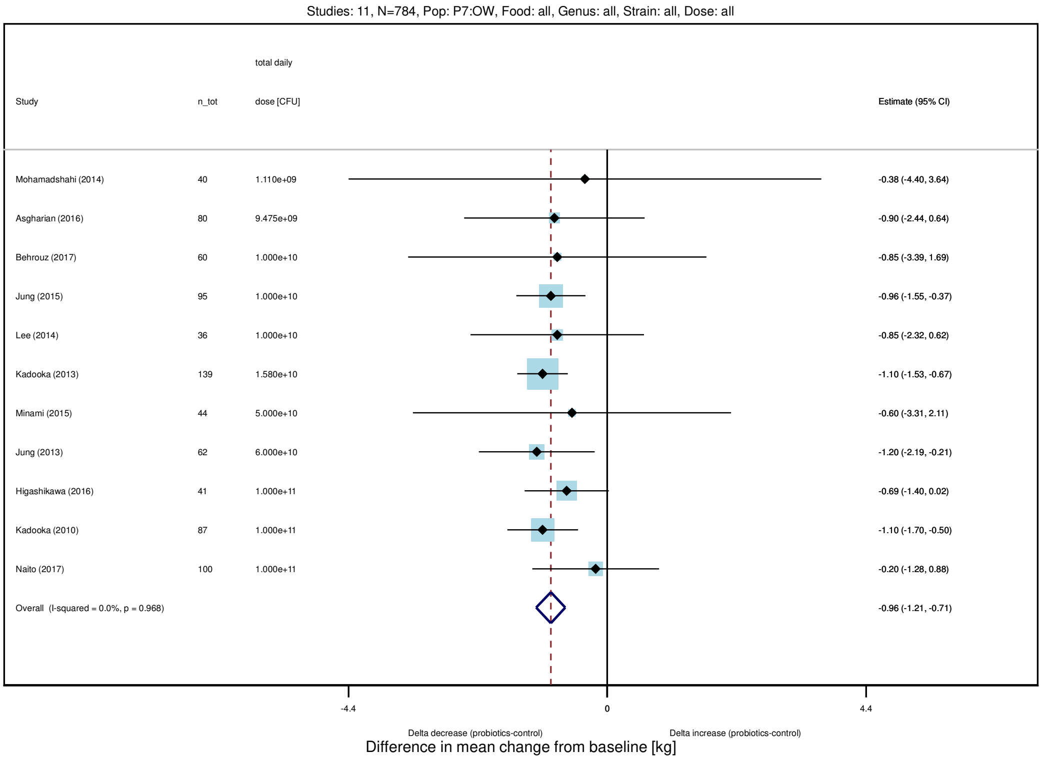
Supplementary Figure 68 Estimate of probiotics effect on waist circumference. Subgroup analysis in obese subjects.



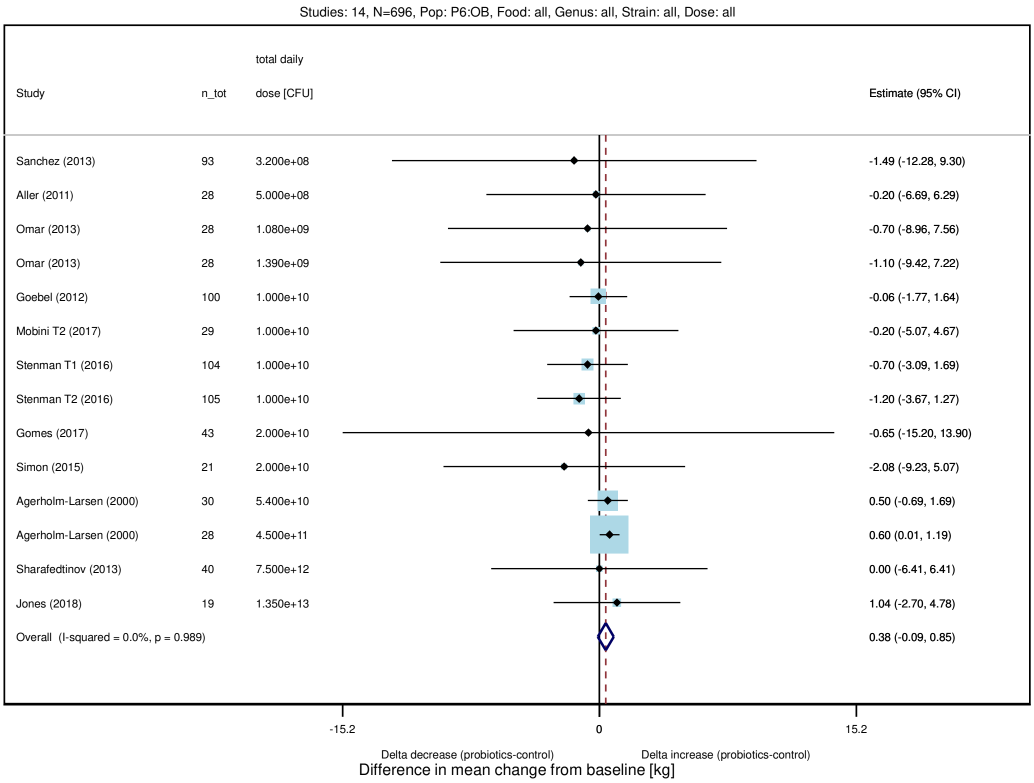
Supplementary Figure 69 Estimate of probiotics effect on body fat mass. Subgroup analysis in normal weight subjects.



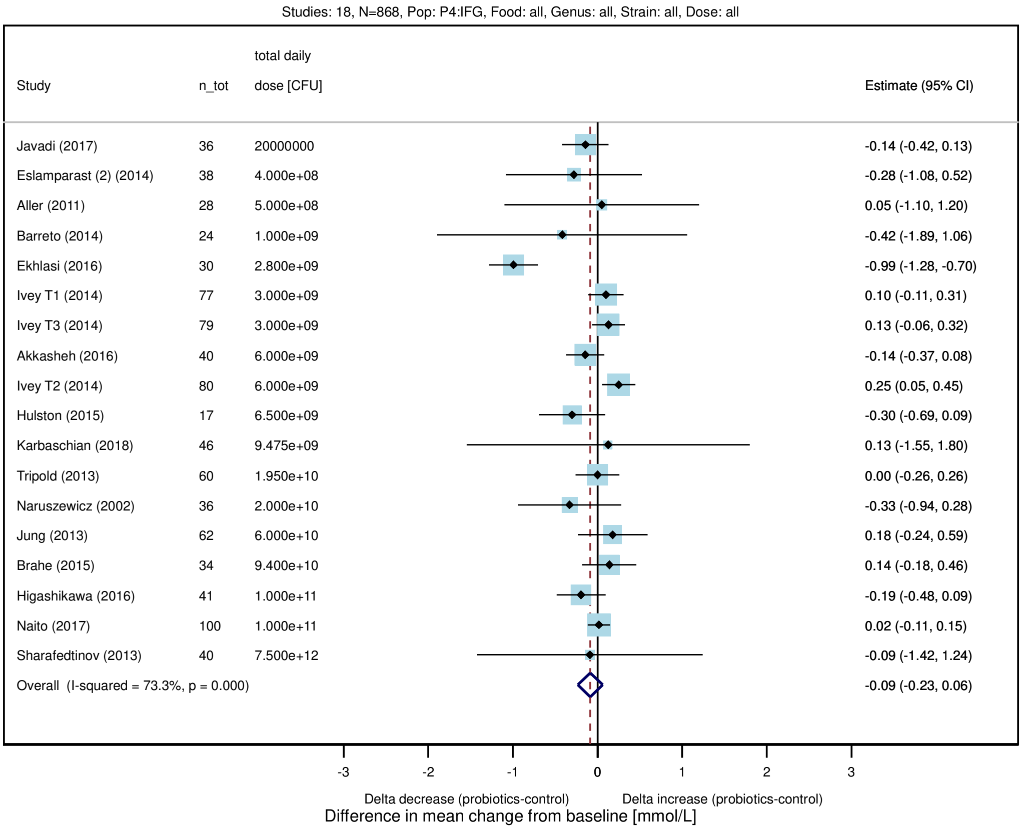
Supplementary Figure 70 Estimate of probiotics on body fat mass. Subgroup analysis in overweight subjects.



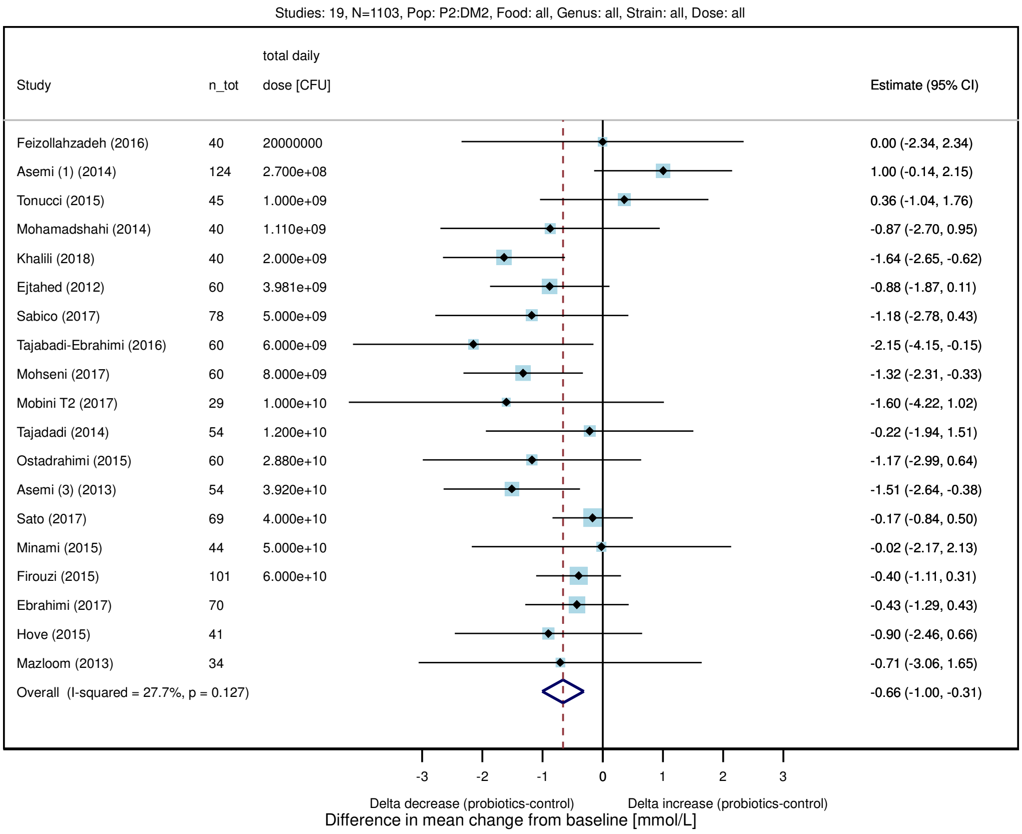
Supplementary Figure 71 Estimate of probiotics on body fat mass. Subgroup analysis in obese subjects.



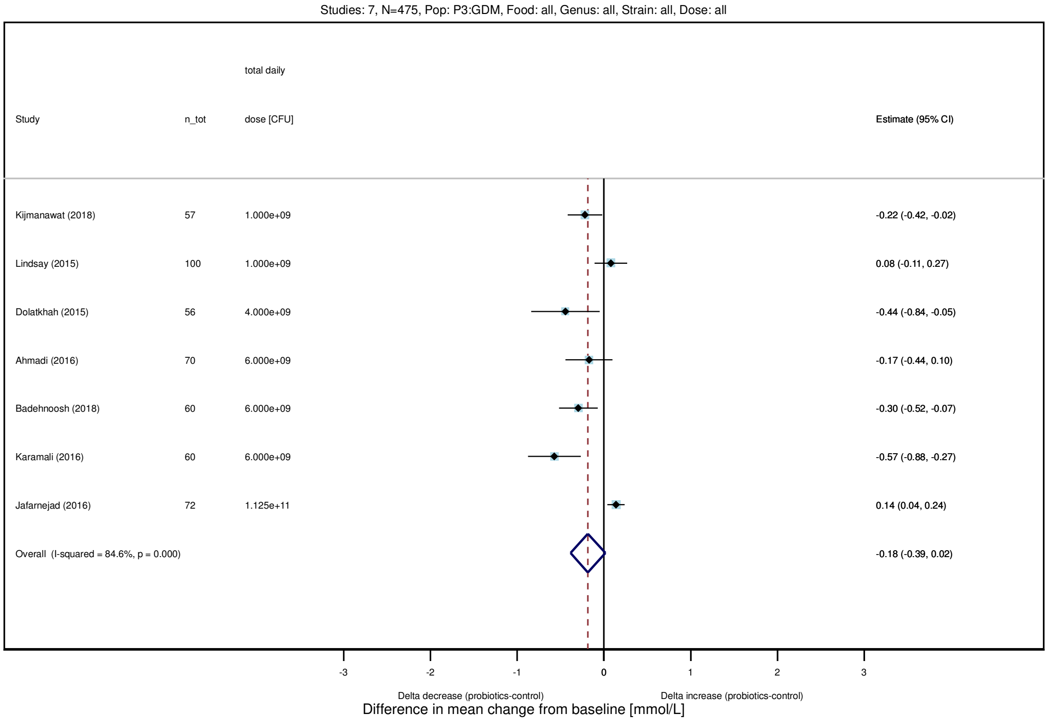
Supplementary Figure 72 Estimate of probiotics on fasting glucose. Subgroup analysis in impaired fasting glucose subjects.



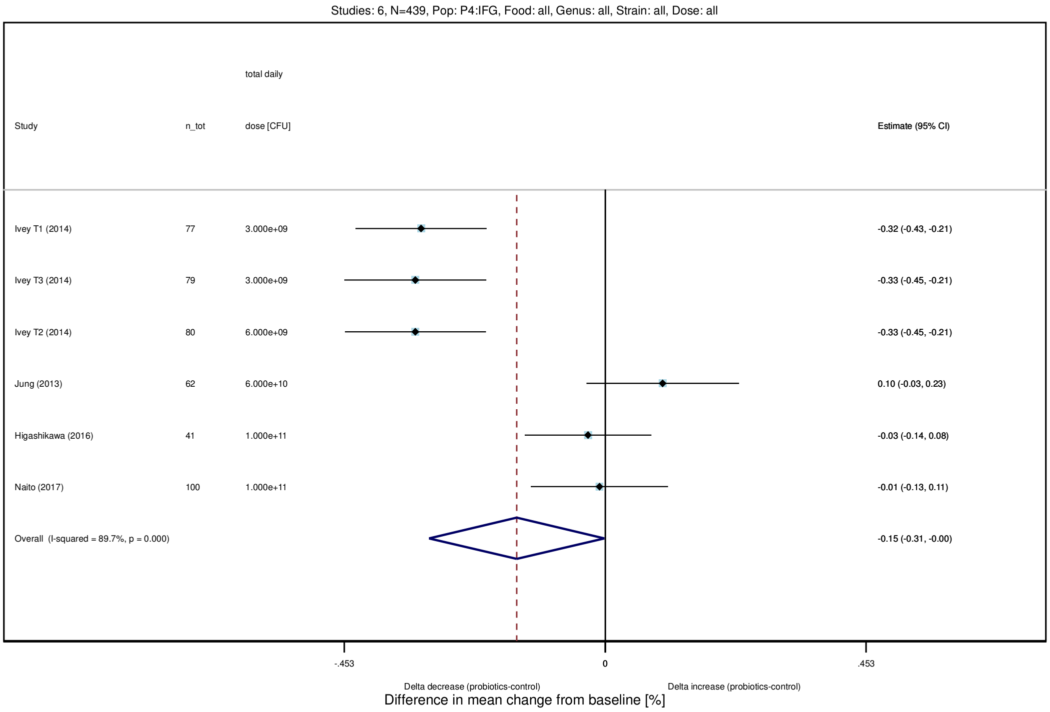
Supplementary Figure 73 Estimate of probiotics on fasting glucose. Subgroup analysis in type 2 diabetes mellitus subjects.



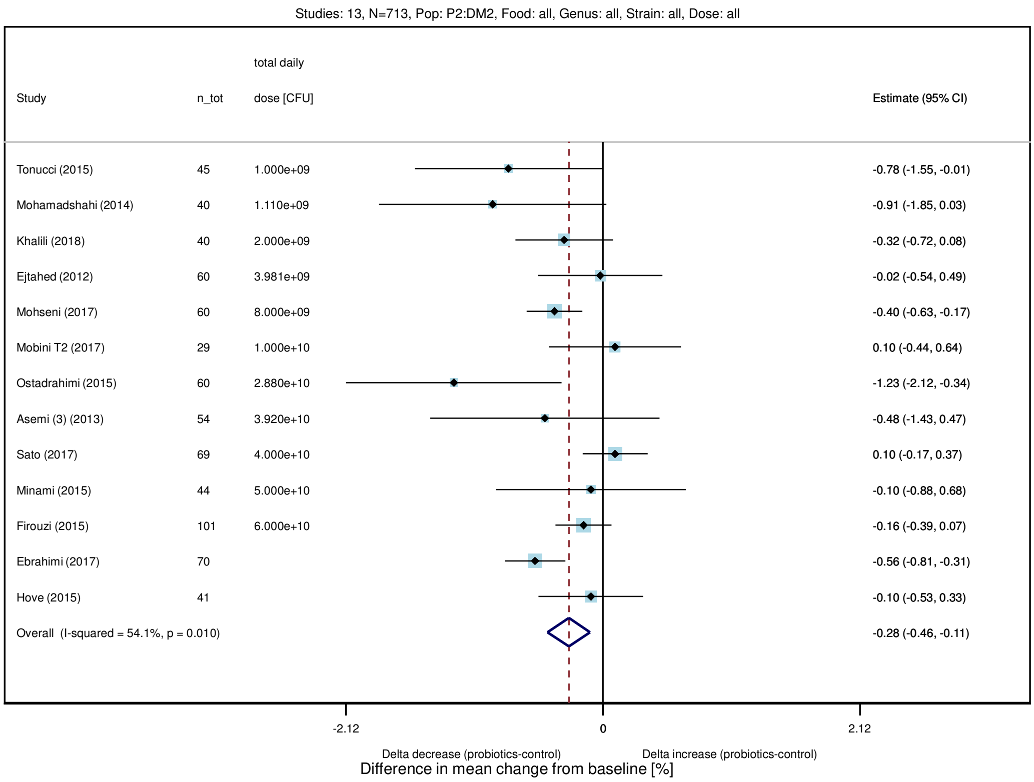
Supplementary Figure 74 Estimate of probiotics on fasting glucose. Subgroup analysis in gestational diabetes mellitus.



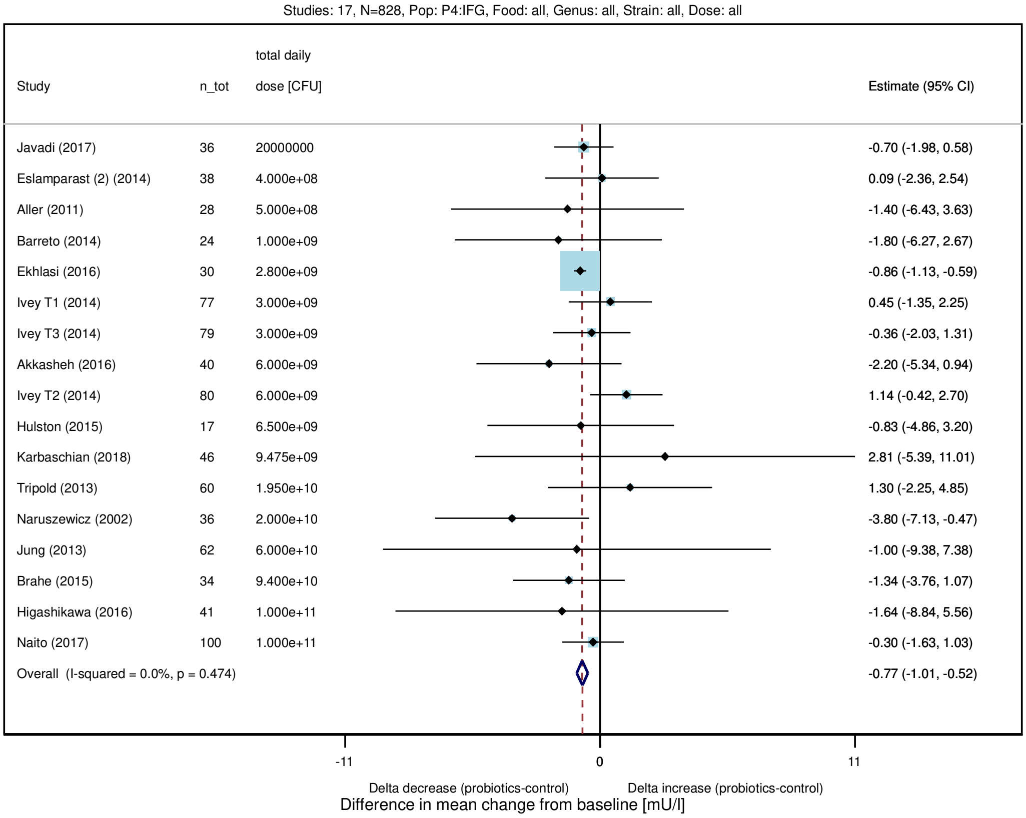
Supplementary Figure 75 Estimate of probiotics effect on glycated haemoglobin. Subgroup analysis in impaired fasting glucose.



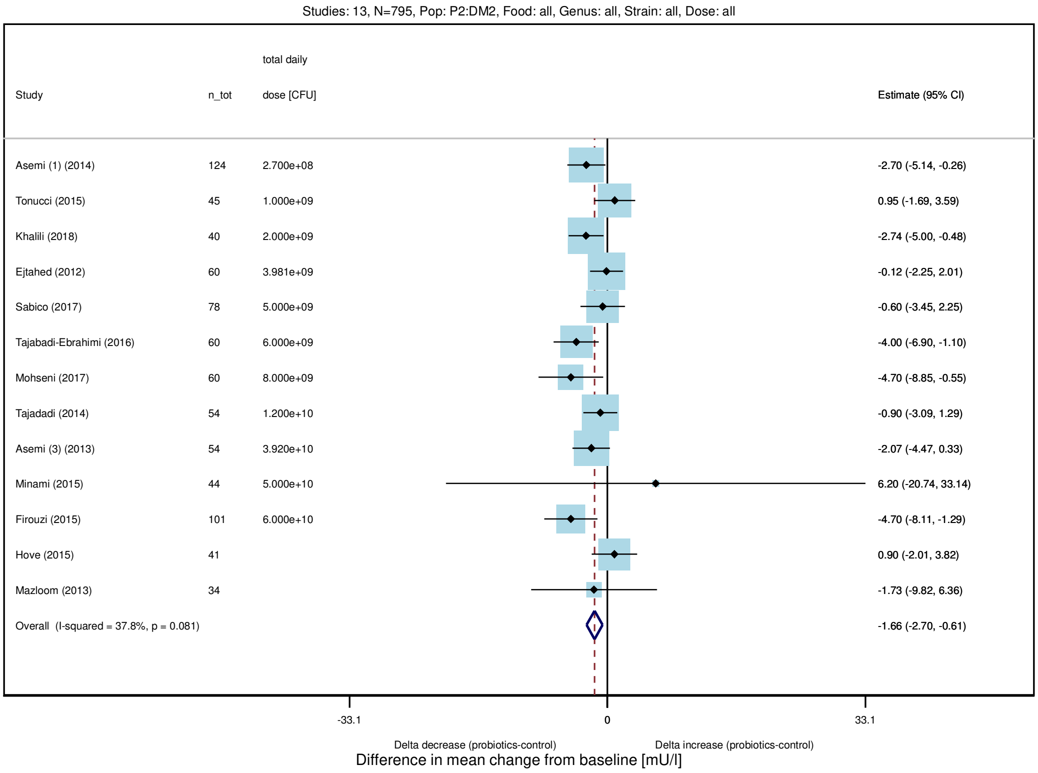
Supplementary Figure 76 Estimate of probiotics effect on glycated haemoglobin. Subgroup analysis in type 2 diabetes mellitus.



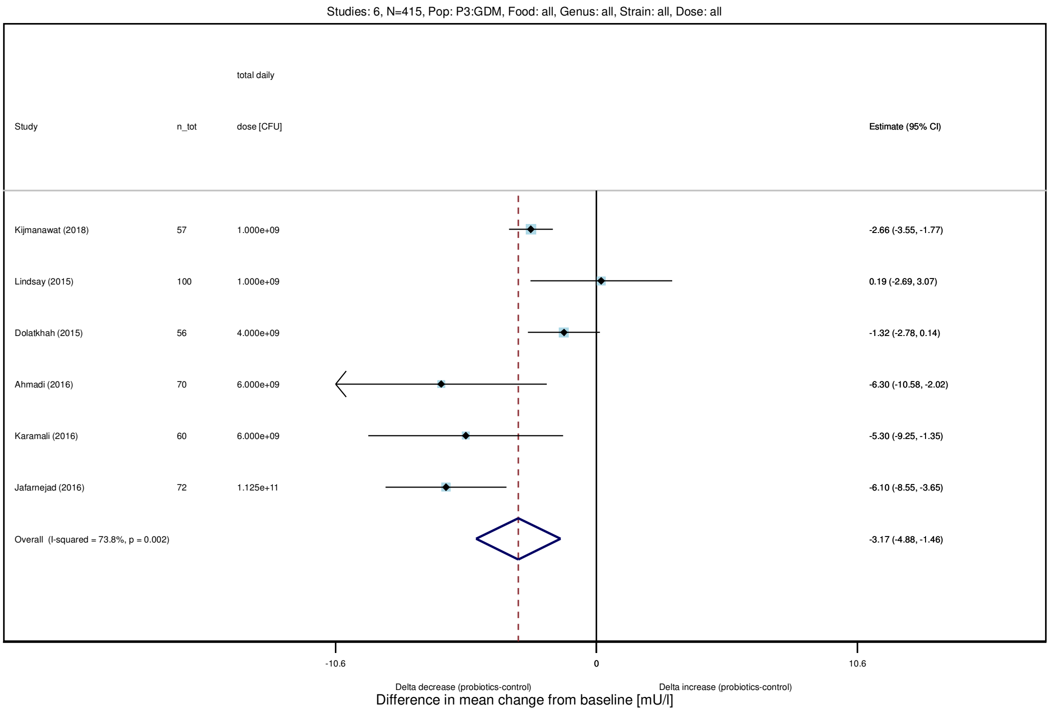
Supplementary Figure 77 Estimate of probiotics effect on fasting insulin. Subgroup analysis in impaired fasting glucose subjects.



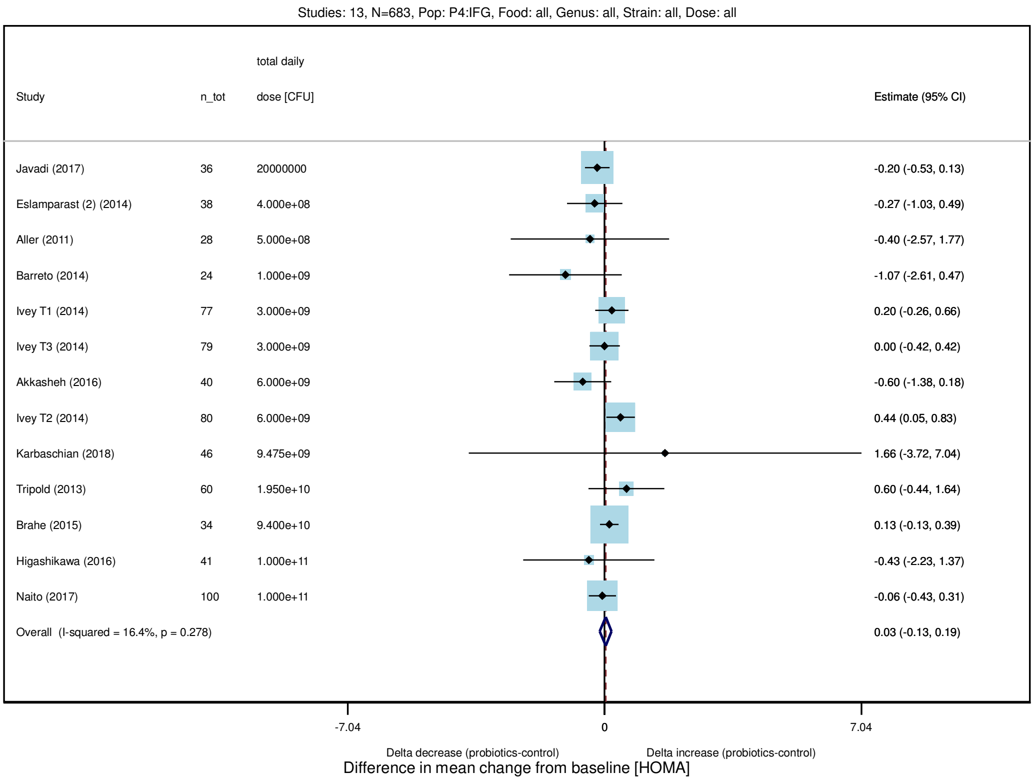
Supplementary Figure 78 Estimate of probiotics effect on fasting insulin. Subgroup analysis in type 2 diabetes mellitus subjects.



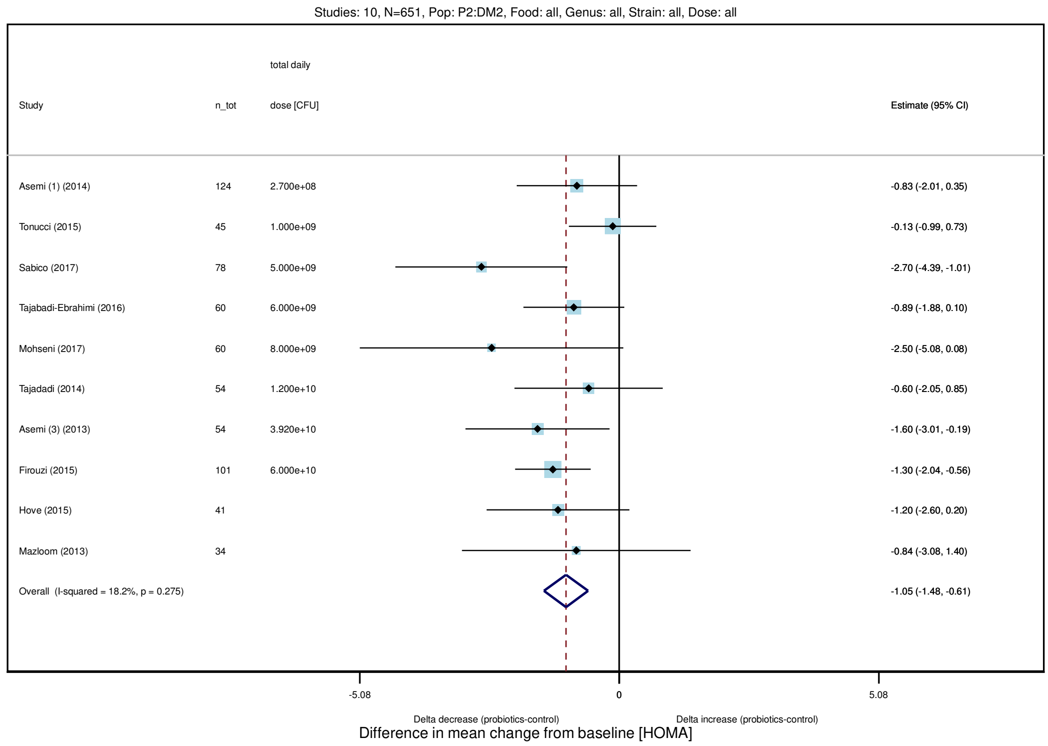
Supplementary Figure 79 Estimate of probiotics effect on fasting insulin. Subgroup analysis in gestational diabetes mellitus.



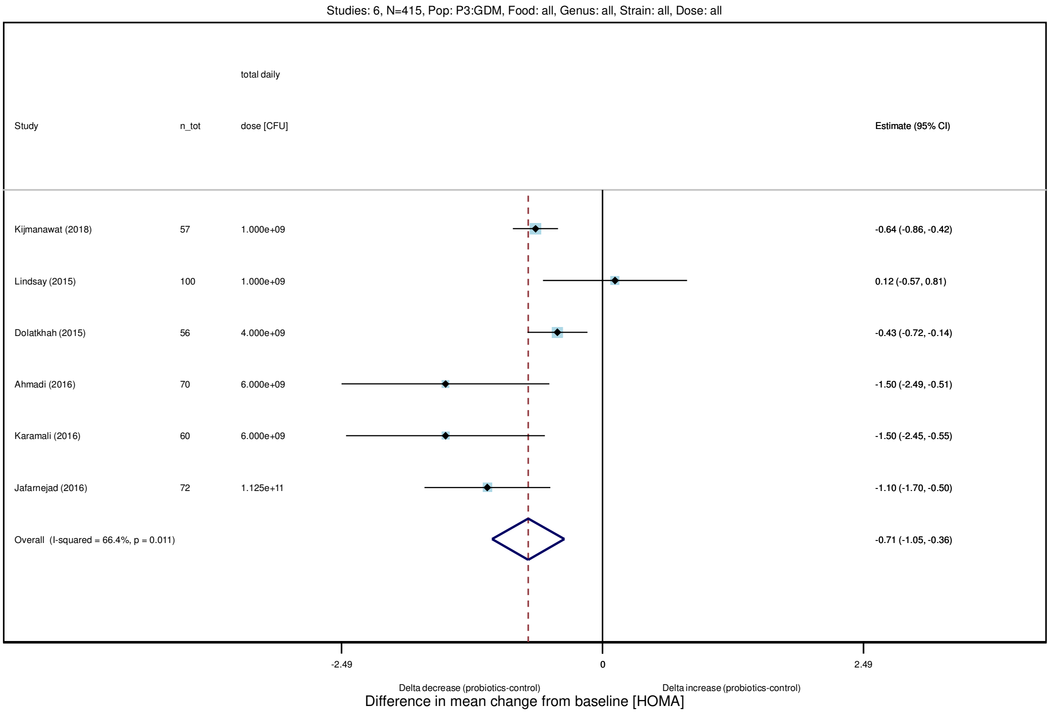
Supplementary Figure 80 Estimate of probiotics effect on homeostasis model of insulin resistance. Subgroup analysis in impaired fasting glucose subjects.



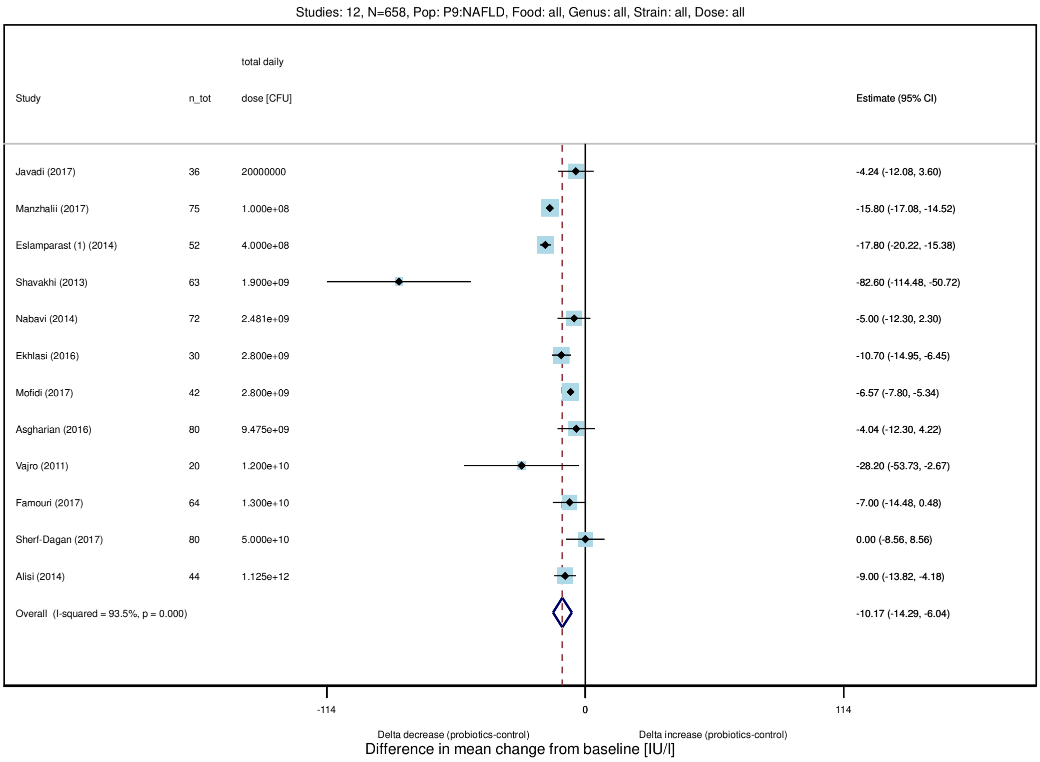
Supplementary Figure 81 Estimate of probiotics effect on homeostasis model of insulin resistance. Subgroup analysis in type 2 diabetes mellitus subjects.



Supplementary Figure 82 Estimate of probiotics effect on homeostasis model of insulin resistance. Subgroup analysis in gestational diabetes mellitus subjects.



Supplementary Figure 83 Estimate of probiotics effect on alanine aminotransferase Subgroup analysis in non-alcoholic fatty liver disease subjects.



Supplementary Figure 84 Estimate of probiotics on aspartate aminotransferase. Subgroup analysis in non-alcoholic fatty liver disease subjects.