**Table 1.** Characteristic of included studies in meta-analysis.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| studies | Country | Study Design | Participant | Sex | Sample size | | Trial Duration  (Week) | Means Age | | Means BMI | |  | Intervention | |
| **IG** | **CG** | **IG** | **CG** | **IG** | **CG** | **Intervention** | **Dose (g\d)** | **Control group** |
| Tuomilehto et al. 1980 | Finland | R/PC/DB | individuals with hypercholesterolemia | F | 10 | 11 | 16 | Middle-Aged | Middle-Aged | NR | NR | Guar-gum | 15 | wheat flower containing no fiber |
| Khan et al. 1981 | USA | R/PC/DB | healthy volunteers | M/F | 12 | 12 | 4 | 25 | 31 | NR | NR | Guar-gum | 9 | Glucose |
| Aro et al. 1981 | Finland | R/PC/DB/CO | Type 2 Diabetes | M/F | 9 | 9 | 12 | 53 | 53 | NR | NR | Guar-gum | 21 | wheat flour |
| Aro et al. 1984 | Finland | R/PC/DB | male subjects with hypercholesterolemia | M | 7 | 7 | 12 | 51 | 51 | NR | NR | Guar-gum | 15 | wheat flour |
| McIvor et al. 1986 | USA | R/PC/DB | Type 2 Diabetes | M/F | 8 | 8 | 26 | 49.6 | 48.5 | NR | NR | Granula bar with Guar-gum | 26/4-39/6 | Granola bars Withaout guar gum |
| Fuessl et al. 1986 | UK | R/PC/DB/CO | Type 2 Diabetes | M/F | 18 | 18 | 4 | 61.3 | 61.3 | 30.1 | 30.1 | guar granules sprinkled over food | 15 | wheat bran sprinkled over food |
| Peterson et al. 1986 | UK | R/CO | Type 2 Diabetes | M/F | 16 | 16 | 6 | 60 | 60 | 27.3 | 27.3 | control bread plus guar granulate | 8.3 | control bread |
| Farrell et al. 1986 | Ireland | PC/DB/CO | Type 2 Diabetes | M/F | 18 | 18 | 16 | NR | NR | NR | NR | Guar | 15 | Wheat bran |
| Ebeling et al. 1987 | Finland | R/PC/DB/CO | Type 1 Diabetes | M/F | 9 | 9 | 4 | 27 | 27 | NR | NR | Guar-gum | 20 | NR |
| Uusitupa et al. 1988 | Finland | DB/R/PC | Type 2 Diabetes | M/F | 20 | 19 | 13 | 59.75 | 60.5 | NR | NR | Guar-gum | 15 | wheat flour |
| Tuomilehto et al. 1988 | Finland | DB/R/CO/PC | hypercholesterolaemic patients | M/F | 29 | 29 | 13 | 57.8 | 57.8 | NR | NR | Guar-gum | 15 | NR |
| Superko et al. 1988 | US | SB/R/CO/PC | Clinically Healthy men | M | 20 | 12 | 8 | 51 | 51 | NR | NR | Guar-gum | 15 | NR |
| Lalor et al. 1989 | UK | DB/R/CO/PC | Obese Type 2 Diabetes | M/F | 19 | 19 | 13 | 58 | 58 | NR | NR | Guar-gum | 15 | NR |
| Laajam et al. 1990 | Saudi Arabia | R/PC/DB/CO | Non-insulin-dependent diabetes mellitus | M/F | 39 | 39 | 4 | 51.5 | 51.5 | 31.2 | 31.2 | Guar-gum | 15 | beef gelatin |
| Vuorinen-Markkola et al. 1992 | Finland | DB/R/PC | hypercholesterolemic patients with insulin-dependent diabetes | M/F | 9 | 8 | 6 | 39 | 37 | 24.7 | 25.1 | Guar-gum | 20 | wheat flour |
| Groop et al. 1993 | Finland | SB/PC | Type 2 Diabetes | M/F | 15 | 15 | 8 | 60 | 60 | 28.6 | 28.6 | Guar-gum | 15 | wheat flour |
| Makkonen et al. 1993 | Finland | DB/R/PC | menopausal women | F | 15 | 15 | 26 | 52.3 | 53.6 | 31 | 30 | Guar-gum | 15 | wheat flour |
| Blake et al. 1997 | UK | R/DB/CO | hypercholesterolemic patients | M/F | 11 | 11 | 3 | 44 | 44 | 26.9 | 26.9 | Guar wheat bread | NR | control bread |
| Alba et al. 2013 | Brazil | DB/R | Type 2 Diabetes | M/F | 23 | 21 | 6 | 60.5 | 63.6 | 30.2 | 29.3 | partially hydrolysed guar gum | 10 | Nothing |

Abbreviations: IG, intervention group; CG, control group; DB, double-blinded; SB, single-blinded; PC, placebo-controlled; CO, controlled; RA, randomized; NR, not reported; F, Female; M, Male; NR, not reported.

**Table 2.** Quality assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **studies** | Random sequence generation | Allocation concealment | Selective reporting | Other sources of bias | Blinding (participants and personnel) | Blinding (outcome assessment) | Incomplete outcome data |
| Tuomilehto et al. 1980 | L | U | H | H | L | U | L |
| Khan et al. 1981 | L | U | L | H | L | U | L |
| Aro et al. 1981 | L | U | H | H | L | U | L |
| Aro et al. 1984 | L | U | L | H | L | U | L |
| McIvor et al. 1986 | L | U | L | H | L | U | L |
| Fuessl et al. 1986 | L | U | L | H | L | U | L |
| Peterson et al. 1986 | L | H | L | H | U | U | L |
| Farrell et al. 1986 | L | U | H | H | L | U | L |
| Ebeling et al. 1987 | L | U | H | H | L | U | L |
| Uusitupa et al. 1988 | L | U | H | H | L | U | L |
| Tuomilehto et al. 1988 | L | U | L | H | L | U | L |
| Superko et al. 1988 | L | U | L | H | H | H | L |
| Lalor et al. 1989 | L | U | L | H | L | U | L |
| Laajam et al. 1990 | U | L | L | H | H | H | H |
| Vuorinen-Markkola et al. 1992 | L | U | L | H | L | U | L |
| Groop et al. 1993 | U | H | H | H | H | H | L |
| Makkonen et al. 1993 | L | U | H | H | L | U | L |
| Blake et al. 1997 | L | U | L | H | L | H | L |
| Alba et al. 2013 | L | H | L | H | L | H | L |

Abbreviations: L, low-risk of bias; H, how-risk of bias; U, unclear-risk of bias.

**Table** **3.** Subgroup analyses of guar gum supplementation on lipid profile in adults.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | NO | WMD (95%CI) | P within group | heterogeneity | | |
|  |  |  |  | P heterogeneity | I2 | P between sub-groups |
| Subgroup analyses of guar gum supplementation on TG concentrations. | | | | | |  |
| Overall effect | 17 | -2.90 (-22.64, 16.83) | 0.773 | <0.001 | 91.5% |  |
| Baseline serum TG |  |  |  |  |  |  |
| <150 | 7 | -3.84 (-11.46, 3.77) | 0.323 | 0.642 | 0.0% | 0.04 |
| ≥150 | 9 | -6.82 (-36.53, 23.09) | 0.655 | <0.001 | 90.0% |
| Trial duration (week) |  |  |  |  |  |  |
| ≥12 | 9 | 10.13 (-6.40, 26.68) | **0.230** | 0.196 | 28.0% | 0.066 |
| <12 | 7 | -15.52 (-41.73, 10.67) | 0.246 | <0.001 | 94.5% |
| Intervention dose (g/d) |  |  |  |  |  |  |
| ≤15 | 12 | -3.56 (-25.39, 18.26) | 0.749 | <0.001 | 93.4% | 0.917 |
| >15 | 3 | 0.95 (-39.02, 40.93) | 0.963 | 0.596 | 0.0% |
| Diabetes status |  |  |  |  |  |  |
| Non-diabetic | 7 | 6.71 (-7.09, 20.51) | 0.341 | 0.048 | 52.8% | 0.117 |
| Diabetic | 10 | -16.49 (-42.03, 9.04) | **0.206** | <0.001 | 84.7% |
| Subgroup analyses of guar gum supplementation on TC concentrations. | | | | | | |
| Overall effect, | 18 | -19.34 (-26.18, -12.49) | **<0.001** | <0.001 | 69.4% |  |
| Baseline serum TC |  |  |  |  |  |  |
| <200 | 2 | -33.73 (-47.12, -20.33) | **<0.001** | 0.753 | 0.0% | 0.048 |
| ≥200 | 15 | -18.06 (-25.90, -10.22) | **<0.001** | <0.001 | 72.2% |
| Trial duration (week) |  |  |  |  |  |  |
| <12 | 10 | -21.57 (-30.31, -9.45) | **<0.001** | <0.001 | 74.7% | 0.398 |
| ≥12 | 8 | -14.77 (-27.90, -1.64) | **0.027** | 0.008 | 63.2% |
| Intervention dose (g/d) |  |  |  |  |  |  |
| ≤15 | 13 | -16.75 (-24.57, -8.92) | **<0.001** | <0.001 | 73.6% | 0.162 |
| >15 | 4 | -27.32 (-53.53, -1.12) | **0.041** | 0.041 | 63.7% |
| Diabetes status |  |  |  |  |  |  |
| Non-diabetic | 7 | -22.03 (-31.93, -12.13) | **<0.001** | 0.020 | 60.1% | 0.551 |
| Diabetic | 11 | -17.64 (-28.13, -7.16) | **0.001** | <0.001 | 75.2% |
| Subgroup analyses of guar gum supplementation on LDL concentrations. | | | | | | |
| Overall effect | 12 | -16.19 (-25.54, -6.83) | **0.001** | <0.001 | 76.2% |  |
| Baseline serum LDL-C |  |  |  |  |  |  |
| <130 | 2 | -9.51 (-58.66, 39.62) | 0.704 | <0.001 | 96.1% | 0.049 |
| ≥130 | 9 | -19.18 (-26.73, -11.62) | **<0.001** | 0.070 | 44.8% |
| Trial duration (week) |  |  |  |  |  |  |
| <12 | 7 | -16.09 (-29.08, -3.11) | **0.015** | <0.001 | 82.0% | 0.213 |
| ≥12 | 5 | -16.86 (-30.64, -3.07) | **0.017** | 0.022 | 65.0% |
| Intervention dose (g/d) |  |  |  |  |  |  |
| ≤15 | 9 | -14.90 (-26.27, -3.53) | **0.010** | <0.001 | 80.5% | 0.381 |
| >15 | 2 | -17.80 (-52.71, 17.09) | 0.317 | 0.070 | 69.2% |
| Diabetes status |  |  |  |  |  |  |
| Non-diabetic | 5 | -25.43 (-34.46, -16.40) | **<0.001** | 0.062 | 55.5% | <0.001 |
| Diabetic | 7 | -8.28 (-20.46, 3.89) | 0.182 | <0.001 | 68.1% |
| Subgroup analyses of guar gum supplementation on HDL concentrations. | | | | | | |
| Overall effect | 15 | -0.59 (-1.92, 0.73) | 0.382 | 0.335 | 10.6% |  |
| Baseline serum HDL-C |  |  |  |  |  |  |
| <50 | 7 | 0.53 (-1.29, 2.36) | 0.566 | 0.968 | 0.0% | 0.129 |
| ≥50 | 7 | -2.37 (-4.56, -0.18) | **0.033** | 0.117 | 41.2% |
| Trial duration (week) |  |  |  |  |  |  |
| <12 | 8 | -0.71 (-2.50, 1.06) | 0.431 | 0.057 | 48.9% | 0.838 |
| ≥12 | 6 | -0.43 (-2.42, 1.55) | 0.665 | 0.926 | 0.0% |
| Intervention dose (g/d) |  |  |  |  |  |  |
| ≤15 | 11 | 0.37 (-1.08, 1.82) | 0.614 | 0.878 | 0.0% | 0.006 |
| >15 | 3 | -3.97 (-11.31, 3.36) | 0.289 | 0.963 | 0.0% |
| Diabetes status |  |  |  |  |  |  |
| Non-diabetic | 7 | -1.99 (-3.83, -0.14) | **0.034** | 0.310 | 15.7% | 0.032 |
| Diabetic | 8 | 0.91 (-0.99, 2.83) | 0.348 | 0.786 | 0.0% |

Abbreviations: CI, confidence interval; WMD, weighted mean differences; TG, triglycerides; TC, total cholesterols; LDL-C, low-density lipoprotein cholesterol, HDL, high-density lipoprotein cholesterol.

**Table 4.** GRADE profile of guar supplementation on lipid profile in adults.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Quality assessment | | | | | | Summary of findings | | Quality  of evidence |
| Outcomes | Risk of bias | Inconsistency | Indirectness | Imprecision | Publication Bias | Number of intervention/control | WMD (95%CI) |
| TG | No serious limitations | Very serious Limitations c | Serious Limitations e | Serious Limitations f | No serious limitations | 555 (283/272) | -2.90 (-22.64, 16.83) | ⊕◯◯◯  Very low |
| TC | No serious limitations | Serious Limitations b | Serious Limitations e | No Serious Limitations | No serious limitations | 577 (289/288) | -19.34 (-26.18, -12.49) | ⊕⊕⊕◯  Moderate |
| LDL-C | No serious limitations | Very serious Limitations c | Serious Limitations e | No Serious Limitations | No serious limitations | 369 (190/179) | -16.19 (-25.54, -6.83) | ⊕⊕◯◯  Low |
| HDL-C | No serious limitations | No serious limitations | Serious Limitations e | Serious Limitations f | No serious limitations | 441 (226/215) | -0.59 (-1.92, 0.73) | ⊕⊕⊕◯  Moderate |

a The test for heterogeneity is significant, and the I2 is high, 91.5%

a The test for heterogeneity is significant, and the I2 is moderate, 69.4%

b The test for heterogeneity is significant, and the I2 is high, 76.2%

e studies conducted subcect with varous conditons.

f values are distributed within opposite direction across studies.