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| **Supplemental table 1.** Characteristics of the studies on the association between dairy products (total dairy, milk, and yogurt) and MetS components | | | | | | | | | | |
| Author, year | Study design | Location | Age (years) | No. of subjects  (% female) | Dietary assessment | Consumption amount | Types of MetS components | OR or RR  (95% CI) | Adjustments | NOS or  STROBE score |
| Total dairy | | | | | | | | | | |
| Alonso  et al,  2005 | Cohort | Spain | >20 | 5880  (61·3%) | 136-item FFQ | (Median g/d)  Q1 (155·6)  Q2 (292·4)  Q3 (385·9)  Q4 (530)  Q5 (798·8) | High blood pressure | 1·00  0·84 (0·54, 1·29) 0·85 (0·54, 1·32) 0·57 (0·34, 0·95) 0·75 (0·45, 1·27) | Age, sex, BMI, physical activity, alcohol consumption, sodium intake,  total energy intake, smoking, hypercholesterolemia,fruit, vegetable, fiber, caffeine, magnesium, potassium, monosaturated fatty acid, and saturated fatty acid intakes | 7 |
| Azadbakht  et al,  2005 | Cross- sectional | Iran | 18-74 | 827 (56·8%) | 168-item FFQ  and  24-h dietary recall | (Servings/d)  Q1 (<1·7)  Q2 (1·7<2·3) Q3 (2·3<3·1) Q4 (≥3·1) | Abdominal obesity | 1·00  0·94 (0·73, 1·19)  0·87 (0·73, 1·12)  0·80 (0·63, 0·98) | Age, total energy, percentage of energy from fat, BMI, use of blood pressure and estrogen medication, smoking, physical activity, food group intake, calcium intake and protein intake | 16 |
| High blood pressure | 1·00  0·96 (0·85, 1·17)  0·89 (0·81, 1·11)  0·83 (0·69, 0·99) |
| Hypertriglyceridemia | 1·00  0·99 (0·80, 1·29)  0·92 (0·82, 1·07)  0·90 (0·74, 1·10) |
| Low HDL cholesterol | 1·00  0·88 (0·71, 1·30)  0·86 (0·72, 1·20)  0·85 (0·74, 1·30) |
| Babio  et al,  2015 | Cohort | Spain | 55-80 | 1386 | 137-item FFQ and  3-d dietary  records | (g/d)  T1 (**≤**287)  T2  (287-449)  T3 (≥450) | Abdominal obesity | 1·00  0·98 (0·79, 1·21)  1·06 (0·83, 1·36) | Sex, age, leisure time physical activity, BMI, current smoker, former smoker and use of hypoglycemic, hypolipidemic, antihypertensive and insulin treatment at baseline, and mean consumption of vegetables, fruit, legumes, cereals, fish, red meat, alcohol, biscuits, olive oil and nuts during the follow-up | 6 |
| 337 | High blood pressure | 1·00  0·86 (0·62, 1·19)  0·93 (0·65, 1·33) |
| 3539 | Hypertriglyceridemia | 1·00  0·70 (0·60, 0·81)  0·92 (0·78, 1·08) |
| 3745 | Low HDL cholesterol | 1·00  0·79 (0·68, 0·91)  0·87 (0·74, 1·03) |
| Choi et al, 2005 | Cohort | USA | 40-75 | 41254 (0%) | 130-item FFQ  and  1-week dietary records | (Servings/d)  Q1 (<0·9) Q2  (0·9-1·3)  Q3  (1·4-1·9)  Q4  (1·9-2·9) Q5 (≥2·9) | Hyperglycemia | 1·00  0·96 (0·80, 1·14)  0·88 (0·73, 1·06)  0·76 (0·63, 0·93)  0·75 (0·61, 0·93) | Age, total energy intake, biennial follow-up time, family history of diabetes, smoking status, BMI, kg/m2,  hypercholesterolemia, hypertension, physical activity, alcohol intake,  cereal fiber intake, trans-fat intake, ratio of polyunsaturated to saturated fat, and glycemic load | 6 |
| Crichton  et al,  2014 | Cross- sectional | Luxembourg | 18-69 | 1352  (51·4%) | 134-item FFQ | (Servings/d)  T1  (0-1·13)  T2  (1·14-2·12)  T3  (2·13-12·5) | Abdominal obesity | 1·00  0·69 (0·48, 0·99) 0·51 (0·32, 0·83) | Age, education, sex, smoking, physical activity, total carbohydrate, total protein, total fat,  total fiber, alcohol, calcium, total energy intake, HDL, LDL, triglycerides and systolic and diastolic blood pressure | 17 |
| Díaz‑López  et al,  2016 | Cohort | Spain | 55-80 | 3454 (62%) | 137-item FFQ  and  dietary  records | (g/d)  136-243  311-376  475-617 | Hyperglycemia | 1·00  0·67 (0·47, 0·94) 0·68 (0·47, 0·98) | Age, sex, BMI, dietary intervention group, leisure time physical activity, educational level, smoking, hypertension, or antihypertensive use, and fasting glucose, HDL-cholesterol, triglyceride concentrations, cumulative average  consumption of dietary variables in energy-adjusted quintiles and  alcohol | 5 |
| Drehmer  et al,  2015 | Cohort | Brazil | 35-74 | 10010  (54·3%) | 114-item FFQ  and  dietary  records | (Servings/d)  <1  1-2  >2-4  >4 | Hyperglycemia | 1·00  0·95 (0·76, 1·19) 0·88 (0·71, 1·09) 0·76 (0·59, 0·97) | Age, sex, race, occupational status,  education, family income, study center, menopausal status, family history of diabetes, smoking status, alcohol intake, physical activity, and intakes of energy, nondairy food groups and anthropometric variables | 7 |
| Engberink  et al,  2009 | Cohort | Netherlands | 20-65 | 21553  (54·8%) | 178-item FFQ  and  24-h dietary recall | (Median g/d)  Q1 (206)  Q2 (359)  Q3 (510)  Q4 (757) | High blood pressure | 1·00  1·08 (0·84, 1·38) 0·95 (0·73, 1·22) 1·11 (0·85, 1·44) | Age, sex, total energy intake, socioeconomic status, BMI, smoking, alcohol intake, daily intake of fruit, vegetables, fish, meat, bread, coffee and tea | 6 |
| Engberink  et al,  2009 | Cohort | Netherlands | ≥55 | 2245  (57·1%) | 170-item FFQ | (Median g/d)  Q1 (164)  Q2 (325)  Q3 (472)  Q4 (691) | High blood pressure | 1·00  0·82 (0·68, 0·98) 0·78 (0·64, 0·93) 0·84 (0·70, 1·01) | Age, sex, BMI, smoking, educational level, total energy intake, alcohol consumption, intake of vegetables, fruit, meat, bread, coffee, and tea | 6 |
| Fumeron  et al,  2011 | Cohort | France | 30-65 | 3435  (50·2%) | 23-item questionnaire | (Servings/d)  >2 vs <1 | Hyperglycemia | 0·85 (0·76, 0·94) | Sex, age, smoking, total fat intake,  physical activity and mean BMI | 9 |
| Grantham et al, 2012 | Cohort | Australia | ≥25 | 5582  (54·9%) | 121-item FFQ | (Servings/d)  T1 (0-1·2)  T2  (>1·2-1·9)  T3  (>1·9-5·8) | Hyperglycemia | 1·00  0·90 (0·64, 1·27)  0·71 (0·48, 1·05) | Age, sex, energy intake, family history of diabetes, education level, level of physical activity, smoking status, triacylglycerol, HDL cholesterol, systolic blood pressure,  WC and hip circumference | 6 |
| Huo Yung Kai  et al,  2014 | Cross- sectional | France | 35-64 | 3017 | 3-d  dietary  records | (g/1000 kJ)  Q1  (0-13·2)  Q2  (13·3-23·1)  Q3  (23·2-36·3)  Q4  (36·4-266) | Hyperglycemia | 1·00  0·64 (0·39, 1·06) 0·92 (0·57, 1·50) 0·58 (0·34, 0·99) | Region, gender, age, education level, physical activity, alcohol intake, smoking habits, diet, programme national nutrition santé-global score and total daily energy intake | 14 |
| 3049 | High blood pressure | 1·00  1·06 (0·85, 1·34) 1·01 (0·79, 1·28) 0·84 (0·66, 1·08) |
| 3031 | Hypertriglyceridemia | 1·00  0·89 (0·70, 1·14) 0·82 (0·63, 1·06) 0·73 (0·56, 0·96) |
| 3031 | Low HDL cholesterol | 1·00  1·12 (0·79, 1·57) 1·23 (0·86, 1·76) 1·07 (0·74, 1·55) |
| Heraclides  et al,  2012 | Cohort | UK | 43-53 | 1750 | 5-d  dietary  records | (Median g/d)  T1 (224·1)  T2 (275·3)  T3 (309) | High blood pressure | 1·00  0·88 (0·68, 1·14) 0·93 (0·72, 1·18) | Sex, energy | 5 |
| Kiriiet al,  2009 | Cohort | Japan | 40-59 | 59796 (56·7%) | 147-item FFQ  and  dietary  records | (g/d)  <50  50<150  150<300  ≥300 | Hyperglycemia | Men  1·00  0·99 (0·79, 1·23)  1·04 (0·85, 1·28)  1·18 (0·90, 1·56)  Women  1·00  0·82 (0·64, 1·07)  0·82 (0·64, 1·04)  0·71 (0·51, 0·98) | Age, area, BMI, family history of diabetes mellitus, smoking status, alcohol intake, history of hypertension, exercise frequency, consumption of coffee, energy-adjusted magnesium and total energy | 6 |
| Liu  et al,  2006 | Cohort | USA | ≥45 | 37183  (100%) | 131-item FFQ  and  1-week dietary records | (Servings/d)  Q1 (<0·85)  Q2  (0·89-1·35)  Q3  (1·36-1·9)  Q4  (1·9-2·9)  Q5 (>2·9) | Hyperglycemia | 1·00  0·90 (0·76, 1·01) 0·79 (0·65, 0·96) 0·79 (0·64, 0·99) 0·68 (0·52, 0·89) | Age, treatment,  calorie, family history of diabetes, smoking status, BMI, hypercholesterolemia, hypertension, physical activity, hormones, alcohol consumption, dietary intakes of fibers, total fat, dietary glycemic load, dietary calcium, vitamin D and magnesium | 6 |
| Louie  et al,  2012 | Cohort | Australia | ≥49 | 1824  (57·7%) | 145-  item FFQ | (Median servings/d)  Q1 (0·5)  Q2 (1·2)  Q3 (1·8)  Q4 (3·1) | Hyperglycemia | 1·00  1·29 (0·74, 2·26)  1·00 (0·47, 2·11)  1·50 (0·47, 4·77) | Age, sex, systolic blood pressure, baseline BMI status, HDL cholesterol, total cholesterol, triglyceride and calcium | 6 |
| Margolis  et al,  2011 | Cohort | USA | 50-79 | 82076  (100%) | 122-  item FFQ | (Servings/d)  Q1 (0-0·7)  Q2  (0·7-1·2) Q3  (1·2-1·8) Q4  (1·8-2·6) Q5  (2·6-15·7) | Hyperglycemia | 1·00  0·92 (0·83, 1·01) 0·86 (0·78, 0·95) 0·85 (0·76, 0·95) 0·93 (0·83, 1·04) | Age, race/ethnicity, total energy intake, income, education, smoking, alcohol intake, family history of diabetes, use of postmenopausal hormone therapy, systolic blood pressure, diastolic blood pressure, BMI, physical activity, dietary glycemic load, dietary total fat, dietary total fiber and total magnesium | 6 |
| Martins  et al,  2015 | Cross- sectional | Brazil | 23-25 | 2031 (51·6%) | 75-  item FFQ | (Portions/d)  Q1  (0·0-0·6)  Q2  (0·7-1·2)  Q3  (1·3-1·7)  Q4  (1·8-2·6)  Q5  (2·7-14·2) | Hyperglycemia | 1·00  0·78 (0·39, 1·56) 0·68 (0·31, 1·46) 0·68 (0·31, 1·49) 0·51 (0·20, 1·27) | Sex, age, daily calorie consumption, schooling, marital status, smoking, physical activity, alcohol consumption, fat, carbohydrate, protein consumption,  vegetables, fruits, fruit juices, bread, cereals, rice, meat, fish, eggs, fat, oil and sweets | 16 |
| Abdominal obesity | 1·00  0·95 (0·70, 1·29) 1·04 (0·74, 1·47) 1·03 (0·70, 1·52) 0·95 (0·56, 1·59) |
| High blood pressure | 1·00  1·11 (0·77, 1·59) 1·16 (0·79, 1·70) 1·09 (0·74, 1·62) 0·65 (0·41, 1·03) |
| Hypertriglyceridemia | 1·00  1·15 (0·74, 1·77) 1·22 (0·78, 1·91) 0·97 (0·61, 1·56) 1·11 (0·66, 1·85) |
| Low HDL cholesterol | 1·00  1·08 (0·81, 1·44) 1·12 (0·82, 1·52) 0·99 (0·72, 1·35) 0·87 (0·62, 1·23) |
| Moslehi  et al,  2016 | Nested case-control | Iran | (Mean age)43·6 | 698  (54·3%) | 168-  item FFQ  and  24-h dietary recall | (Median g/d)  T1 (164)  T2 (335)  T3 (527) | Hyperglycemia | 1·00  0·77 (0·49, 1·20)  0·73 (0·47, 1·16) | Age, sex, date of blood drawn and controlled for family history of diabetes, BMI at baseline, WC at baseline, total energy intake, high blood pressure, high triglyceride, high cholesterol at baseline and BMI change | 6 |
| Rashidi Pour Fard  et al,  2015 | Cross- sectional | Iran | 60-78 | 107 | 168-  item FFQ | (g/d)  T1  (<334·06)  T2 (334·06-  689·12)  T3  (>689·12) | Low HDL cholesterol | 1·00  0·75 (0·24, 2·41) 0·46 (0·12, 1·76) | Gender, smoking, socioeconomic, fat, energy intake, fruit, vegetable, dietary fiber, red meat and BMI | 16 |
| Shin  et al,  2013 | Cohort | Korea | 40-69 | 5745 | 110-  item FFQ  and  3-d  dietary  records | (Times/week)  None  1  2-3  4-6  ≥7 | Hyperglycemia | 1·00  1·01 (0·81, 1·26)  0·83 (0·66, 1·04)  0·90 (0·72, 1·12)  0·91 (0·75, 1·10) | Age, sex, physical activity, daily alcohol consumption,  smoking pack-year, income, education and total energy intake | 8 |
| 6222 | Abdominal obesity | 1·00  0·92 (0·50, 1·14)  1·05 (0·85, 1·28)  0·82 (0·67, 1·01)  0·73 (0·61, 0·88) |
| 5643 | High blood pressure | 1·00  1·11 (0·90, 1·38)  1·03 (0·83, 1·28)  0·95 (0·76, 1·18)  0·97 (0·80, 1·16) |
| 5200 | Hypertriglyceridemia | 1·00  0·86 (0·69, 1·07)  0·78 (0·62, 0·97)  0·92 (0·75, 1·13)  0·85 (0·71, 1·02) |  |
| 4010 | Low HDL cholesterol | 1·00  1·01 (0·83, 1·23)  0·79 (0·64, 0·97)  0·92 (0·76, 1·12)  0·95 (0·81, 1·13) |
| Sluijs  et al, 2012 | Nested case-control | 8 European countries | (Mean age)55·6 | 24475 | FFQ  and  24-h dietary recall | (g/d)  Q1 (≤139·4) Q2  (139·5-239·3)  Q3  (239·4-341·2)  Q4  (341·3-501·9)  Q5 (≥502) | Hyperglycemia | 1·00  1·00 (0·90, 1·11)  1·02 (0·91, 1·14) 0·96 (0·84, 1·11) 0·97 (0·82, 1·15) | Age, sex, BMI, educational level, smoking status, physical activity level, alcohol intake, intake of energy and energy-adjusted intakes of fruit plus vegetables, red meat, processed meat, sugar-sweetened  soft drinks, coffee, cereals, cereal products, dietary intake of calcium, magnesium and vitamin D | 6 |
| Soedamah-Muthu  et al, 2013 | Cohort | UK | 35-55 | 4526  (28%) | 114-  item FFQ | (Median g/d)  T1 (246)  T2 (371)  T3 (575) | Hyperglycemia | 1·00  1·24 (0·92, 1·69)  1·30 (0·95, 1·77) | Age, ethnicity, employment grade, smoking, alcohol intake, BMI, physical activity, family history of CHD/hypertension, fruit and vegetables, bread, meat, fish, coffee, tea and total energy intake | 7 |
| Struijk  et al,  2013 | Cohort | Denmark | 30-60 | 5953  (52·5%) | 198-  item FFQ | (g/d)  Q1  (17-78)  Q2  (55-182)  Q3  (206-304)  Q4  (524-766) | Hyperglycemia | 1·00  1·12 (0·67, 1·84)  1·34 (0·82, 2·18)  0·96 (0·58, 1·58) | Age, gender, intervention group, diabetes family history, education level, physical activity, smoking status, alcohol, wholegrain cereal, meat, fish, coffee, tea, fruit, vegetables, energy intake, change in diet from baseline to 5-year follow-up and WC | 5 |
| van Dam  et al, 2006 | Cohort | USA | 21-69 | 41186  (100%) | 68-  item FFQ, 3-d  dietary  records and  24-h dietary recall | (Servings)  <1 (week)  1-4 (week)  5-6 (week)  1 (day)  ≥2 (day) | Hyperglycemia | 1·00  0·98 (0·83, 1·16) 0·87 (0·72, 1·06) 0·91 (0·76, 1·08) 0·93 (0·75, 1·15) | Age, total energy intake, BMI, smoking status, strenuous physical activity, alcohol consumption, parental history of diabetes, education level, coffee consumption, sugar-sweetened soft drink consumption and quintiles of processed meat and other red meat consumption | 7 |
| Wang  et al,  2015 | Cohort | USA | 28-62 | 6661  (58·1%) | 126-  item FFQ  and  7-d  dietary  records | (Servings/d) | High blood pressure | 0·92 (0·86, 0·99) | Sex, baseline age, time-varying total energy, the multiplicative term of follow-up time with age, time-varying smoking status, physical activity, modified dietary guidelines adherence index score, caffeine coffee intake, the multiplicative terms of follow-up time with physical activity and BMI at the beginning of each exam interval | 7 |
| Zong  et al,  2014 | Cohort | China | 50-70 | 2091  (58·9%) | 74-  item FFQ | (Servings/d)  None  ≤0·5  0·5-1  >1 | Hyperglycemia | 1·00  0·86 (0·71, 1·06) 0·83 (0·67, 1·02) 0·81 (0·63, 1·05) | Age, sex, region, residence, smoking, family history of diabetes, BMI, dietary fiber intake, changes in BMI, WC and changes in glucose | 7 |
| Milk | | | | | | | | | |  |
| Babio  et al,  2015 | Cohort | Spain | 55-80 | 1386 | 137-item FFQ and  3-d dietary  records | (Median g/d)  T1 (120)  T2 (222)  T3 (462) | Abdominal obesity | 1·00  1·02 (0·83, 1·26)  1·08 (0·86, 1·36) | Sex, age, leisure time physical activity, BMI, current smoker, former smoker and use of hypoglycemic, hypolipidemic, antihypertensive and insulin treatment at baseline, and mean consumption of vegetables, fruit, legumes, cereals, fish, red meat, alcohol, biscuits, olive oil and nuts during the follow-up | 6 |
| 337 | High blood pressure | 1·00  0·84 (0·60, 1·18) 0·81 (0·57, 1·15) |
| 3539 | Hypertriglyceridemia | 1·00  0·79 (0·68, 0·92)  0·92 (0·79, 1·08) |
| 3745 | Low HDL cholesterol | 1·00  0·92 (0·79, 1·06)  0·84 (0·72, 0·98) |  |
| Choi et al, 2005 | Cohort | USA | 40-75 | 41254 (0%) | 130-item FFQ  and  1-week dietary records | (Servings)  Q1 (<1/month) Q2  (1/month-1/week)  Q3  (2-4/week)  Q4  (5/week-1/d) Q5 (≥2/d) | Hyperglycemia | Skim/Low-fat milk  1·00  1·15 (0·96, 1·38) 0·93(0·78, 1·12) 0·95 (0·80, 1·13) 0·78 (0·63, 0·97) | Age, total energy intake, biennial follow-up time, family history of diabetes, smoking status, BMI, kg/m2,  hypercholesterolemia, hypertension, physical activity, alcohol intake,  cereal fiber intake, trans-fat intake, ratio of polyunsaturated to saturated fat, and glycemic load | 6 |
| (Servings)  Q1 (<1/month) Q2  (1-3/month)  Q3  (1/week) Q4 (≥2/week) | Whole milk  1·00  1·05 (0·87, 1·28) 0·97 (0·72, 1·29) 1·19 (1·00, 1·43) |
| Crichton  et al,  2014 | Cross- sectional | Luxembourg | 18-69 | 1352  (51·4%) | 134-item FFQ | (Servings/d)  T1  (0-1·13)  T2  (1·14-2·12)  T3  (2·13-12·5) | Abdominal obesity | Whole-fat milk  1·00  0·79 (0·53, 1·16) 0·61 (0·44, 0·86)  Low-fat milk  1·00  1·24 (0·82, 1·86) 1·30 (0·93, 1·82) | Age, education, sex, smoking, physical activity, total carbohydrate, total protein, total fat,  total fiber, alcohol, calcium, total energy intake, HDL, LDL, triglycerides and systolic and diastolic blood pressure | 17 |
| Díaz‑López  et al,  2016 | Cohort | Spain | 55-80 | 3454 (62%) | 137-item FFQ  and  dietary  records | (g/d)  39-155  200-237  335-480 | Hyperglycemia | 1·00  0·93 (0·66, 1·31) 0·80 (0·56, 1·14) | Age, sex, BMI, dietary intervention group, leisure time physical activity, educational level, smoking, hypertension, or antihypertensive use,  and fasting glucose, HDL-cholesterol, triglyceride concentrations, cumulative average consumption  of dietary variables in energy-adjusted quintiles and alcohol | 5 |
| Elwood  et al,  2007 | Cohort | UK | 45-59 | 2375  (0%) | FFQ  and  1-week dietary records | Lowest 1/4  Next 1/4  Next 1/4  Highest 1/4 | Hyperglycemia | 1·00  0·80  0·82  0·57  (0·20, 1·63) | BMI | 5 |
| Funtikova  et al,  2015 | Cohort | Spain | 25-74 | 2181 | 166-item FFQ | (g/d)  No consumption  0<200  ≥200 | Abdominal obesity | Whole milk  1·00  1·38 (1·03, 1·81)  1·15 (0·89, 1·47)  Skim and low-fat milk  1·00  0·81 (0·55, 1·13)  0·90 (0·72, 1·12) | Sex, age, baseline WC, smoking, energy intake, educational level, leisure-time physical activity, modified mediterranean  diet score and energy under- and over-reporting | 9 |
| Grantham et al, 2012 | Cohort | Australia | ≥25 | 5582  (54·9%) | 121-item FFQ | (Servings/d)  T1 (0-1·2)  T2  (>1·2-1·9)  T3  (>1·9-5·8) | Hyperglycemia | Low-fat milk  1·00  0·85 (0·60, 1·20)  0·65 (0·44, 0·94)  Full-fat milk  1·00  1·38 (0·97, 1·97)  1·18 (0·78, 1·79) | Age, sex, energy intake, family history of diabetes, education level, level of physical activity, smoking status, triacylglycerol, HDL cholesterol, systolic blood pressure,  WC and hip circumference | 6 |
| Kim  et al,  2013 | Cross- sectional | Korea | ≥19 | 4862 (59%) | FFQ  and  24-h dietary recall | None or rarely  **≤**2-3 per month  **≤**4-6 per week  ≥once per day | Hyperglycemia | 1·00  1·25 (1·02, 1·52) 0·99 (0·82, 1·20) 0·93 (0·73, 1·17) | Age, sex, education level, income, smoking status, BMI, alcohol intake, physical activity, energy intake, fat intake, calcium  intake and fibre intake | 16 |
| Abdominal obesity | 1·00  0·94 (0·72, 1·24) 0·91 (0·70, 1·17) 0·68 (0·50, 0·93) |  |
| High blood pressure | 1·00  0·97 (0·79, 1·19) 0·90 (0·74, 1·09) 0·94 (0·75, 1·19) |
| Hypertriglyceridemia | 1·00  1·11 (0·91, 1·35) 0·87 (0·72, 1·05) 0·82 (0·60, 1·03) |
| Low HDL cholesterol | 1·00  1·01 (0·83, 1·23) 0·94 (0·78, 1·13) 0·93 (0·75, 1·17) |
| Kiriiet al,  2009 | Cohort | Japan | 40-59 | 59796 (56·7%) | 147-item FFQ  and  dietary  records | (g/d)  <50  50<100  100<200  ≥200 | Hyperglycemia | Men  1·00  1·07 (0·66, 1·72)  0·90 (0·71, 1·13)  1·02 (0·85, 1·24)  Women  1·00  1·29 (0·83, 2·01)  1·08 (0·84, 1·39)  0·87 (0·70, 1·09) | Age, area, BMI, family history of diabetes mellitus, smoking status, alcohol intake, history of hypertension, exercise frequency, consumption of coffee, energy-adjusted magnesium and total energy | 6 |
| Kwon  et al,  2010 | Cross- sectional | Korea | ≥19 | 4890 (58%) | FFQ  and  24-h dietary recall | 1st quartile  (rarely)  2nd quartile  (≤1/week)  3rd quartile  (2-6/week)  4th quartile  (≥1/day) | Hyperglycemia | 1·00  0·96 (0·74, 1·24)  1·31 (0·99, 1·74)  1·35 (1·04, 1·74) | Age, sex, BMI, education level, smoking status, regular exercise, daily amount of alcohol intake, daily amount of total energy intake and daily amount of fiber | 17 |
| Abdominal obesity | 1·00  0·92 (0·72, 1·18)  0·89 (0·68, 1·19)  0·82 (0·64, 1·06) |
| High blood pressure | 1·00  1·00 (0·82, 1·21)  0·87 (0·10, 1·08)  0·90 (0·74, 1·09) |
| Hypertriglyceridemia | 1·00  0·84 (0·69, 1·01)  0·83 (0·68, 1·02)  0·84 (0·70, 1·02) |
| Low HDL cholesterol | 1·00  0·75 (0·63, 0·89)  0·83 (0·69, 1·00)  0·75 (0·63, 0·89) |
| Liu  et al,  2006 | Cohort | USA | ≥45 | 37183  (100%) | 131-  item FFQ  and  1-week dietary records | (Servings)  <1/month  1-3/month 1/week ≥2/week | Hyperglycemia | Skim milk  1·00  1·05 (0·86, 1·27) 0·87 (0·69, 1·10) 0·92 (0·78, 1·09)  Whole milk  1·00  1·06 (0·88, 1·28) 1·32 (0·98, 1·79) 1·04 (0·84, 1·30) | Total energy intake, randomized-treatment assignment, age, family history of diabetes, smoking status, BMI, hypercholesterolemia, hypertension, hormones, physical activity, alcohol consumption, dietary intakes of fibers, total fat, dietary glycemic load, dietary calcium, vitamin D and magnesium | 6 |
| Moslehi  et al,  2016 | Nested case-control | Iran | (Mean age)43·6 | 698  (54·3%) | 168-  item FFQ  and  24-h dietary recall | (Median g/d)  T1 (15)  T2 (115)  T3 (234) | Hyperglycemia | 1·00  0·95 (0·61, 1·47)  0·62 (0·38, 0·99) | Age, sex, date of blood drawn and controlled for family history of diabetes, BMI at baseline, WC at baseline, total energy intake, high blood pressure, high triglyceride, high cholesterol at baseline and BMI change | 6 |
| Satija  et al,  2013 | Cross- sectional | India | ≥18 | 6357  (41·8%) | 184-  item FFQ  and  24-h dietary recall | (Portions/d)  Never  <1  ≥1 | Abdominal obesity | Men  1·00  0·68 (0·52, 0·88)  0·71 (0·54, 0·93)  Women  1·00  0·94 (0·72, 1·21)  0·79 (0·59, 1·05) | Age, education, standard of living, migration status, tobacco consumption, alcohol consumption, energy expenditure and energy intake | 19 |
| Shin  et al,  2013 | Cohort | Korea | 40-69 | 6705 | 110-  item FFQ  and  3-d  dietary  records | (Times/week)  None  1  2-3  4-6  ≥7 | Hyperglycemia | 1·00  0·98 (0·79, 1·20)  0·82 (0·66, 1·02)  0·98 (0·79, 1·22)  0·94 (0·78, 1·13) | Age, sex, physical activity, daily alcohol consumption,  smoking pack-year, income, education and total energy intake | 8 |
| 6222 | Abdominal obesity | 1·00  1·01 (0·83, 1·22)  1·03 (0·85, 1·25)  0·88 (0·71, 1·09)  0·82 (0·68, 0·97) |
| 5643 | High blood pressure | 1·00  1·05 (0·86, 1·28)  0·92 (0·75, 1·14)  0·94 (0·76, 1·17)  0·96 (0·80, 1·14) |
| 5200 |  | Hypertriglyceridemia | 1·00  1·06 (0·87, 1·29)  0·86 (0·70, 1·06)  1·02 (0·83, 1·25)  0·97 (0·82, 1·16) |
| 4010 | Low HDL cholesterol | 1·00  1·10 (0·91, 1·32)  0·99 (0·82, 1·19)  1·16 (0·96, 1·40)  1·07 (0·91, 1·20) |
| Sluijs  et al, 2012 | Nested case-control | 8 European countries | (Mean age)55·6 | 24475 | FFQ  and  24-h dietary recall | (g/d)  Q1 (≤18·6)  Q2  (18·7-115·2)  Q3  (115·3-207·8)  Q4  (207·9-358·6)  Q5 (≥358·7) | Hyperglycemia | 1·00  1·08 (0·95, 1·23) 1·00 (0·88, 1·14) 1·06 (0·88, 1·27) 1·08 (0·90, 1·31) | Age, sex, BMI, educational level, smoking status, physical activity level, alcohol intake, intake of energy and energy-adjusted intakes of fruit plus vegetables, red meat, processed meat, sugar-sweetened  soft drinks, coffee, cereals, cereal products, dietary intake of calcium, magnesium and vitamin D | 6 |
| Soedamah-Muthu  et al, 2013 | Cohort | UK | 35-55 | 4526  (28%) | 114-  item FFQ | (Median g/d)  T1 (147)  T2 (294)  T3 (441) | Hyperglycemia | 1·00  1·04 (0·78, 1·39) 0·97 (0·71, 1·32) | Age, ethnicity, employment grade, smoking, alcohol intake, BMI, physical activity, family history of CHD/hypertension, fruit and vegetables, bread, meat, fish, coffee, tea and total energy intake | 7 |
| Sun  et al,  2014 | Cohort | China | ≥50 | 20335  (71·2%) | FFQ | (Portions/ week)  0  1-3  >3 | Hyperglycemia | 1·00  0·99 (0·86, 1·13) 1·09 (0·96, 1·24) | Age, sex, phase, education, father’s occupation, longest-held occupation and personal income,  Smoking status, alcohol use and physical activity, BMI and waist-hip ratio | 5 |
| Villegas  et al, 2009 | Cohort | China | 40-70 | 64191  (100%) | 77-  item FFQ and  24-h dietary recall | (Median g/d)  None  <100  100-200  >200 | Hyperglycemia | 1·00  0·61 (0·54, 0·69)  0·56 (0·50, 0·62)  0·46 (0·32, 0·64) | Age, energy intake, BMI, waist-hip ratio, smoking status, alcohol consumption, physical activity, income level, education level, occupation and hypertension | 6 |
| Wang  et al,  2015 | Cohort | USA | 28-62 | 6661  (58·1%) | 126-  item FFQ  and  7-d  dietary  records | (Servings/ week) | High blood pressure | 0·98 (0·95, 1·02) | Sex, baseline age, time-varying total energy, the multiplicative term of follow-up time with age, time-varying smoking status, physical activity, modified dietary guidelines adherence index score, caffeine coffee intake, the multiplicative terms of follow-up time with physical activity and BMI at the beginning of each exam interval | 7 |
| Zong  et al,  2014 | Cohort | China | 50-70 | 2091  (58·9%) | 74-  item FFQ | (Servings/d)  None  ≤0·5  >0·5 | Hyperglycemia | 1·00  1·03 (0·82, 1·29) 0·92 (0·77, 1·12) | Age, sex, region, residence, smoking, family history of diabetes, BMI, dietary fiber intake, changes in BMI, WC and changes in glucose | 7 |
| Yogurt | | | | | | | | | |  |
| Babio  et al,  2015 | Cohort | Spain | 55-80 | 1386 | 137-item FFQ and  3-d dietary  records | Tertile 3 vs Tertile 1 | Abdominal obesity | 0·74 (0·61, 0·91) | Sex, age, leisure time physical activity, BMI, current  smoker, former smoker and use of hypoglycemic, hypolipidemic,  antihypertensive, and insulin treatment at baseline plus mean consumption  during follow-up of vegetables, fruit, legumes, cereals, fish, red meat, cookies, olive oil, nuts, alcohol | 6 |
| Choi et al, 2005 | Cohort | USA | 40-75 | 41254 (0%) | 130-item FFQ  and  1-week dietary records | (Servings)  Q1 (<1/month) Q2  (1-3/month)  Q3  (1/week) Q4 (≥2/week) | Hyperglycemia | 1·00  0·98 (0·84, 1·14) 0·88 (0·69, 1·13) 0·83 (0·66, 1·06) | Age, total energy intake, biennial follow-up time, family history of diabetes, smoking status, BMI, kg/m2,  hypercholesterolemia, hypertension, physical activity, alcohol intake,  cereal fiber intake, trans-fat intake, ratio of polyunsaturated to saturated fat, and glycemic load | 6 |
| Crichton  et al,  2014 | Cross- sectional | Luxembourg | 18-69 | 1352  (51·4%) | 134-item FFQ | (Servings/d)  T1 (0-1·13)  T2  (1·14-2·12)  T3  (2·13-12·5) | Abdominal obesity | Whole-fat yogurt  1·00  0·87 (0·59, 1·28) 0·57 (0·39, 0·85)  Low-fat yogurt  1·00  1·21 (0·67, 1·88) 1·54 (1·07, 2·23) | Age, education, sex, smoking, physical activity, total carbohydrate, total protein, total fat,  total fiber, alcohol, calcium, total energy intake, HDL, LDL, triglycerides and systolic and diastolic blood pressure | 17 |
| Díaz‑López  et al,  2016 | Cohort | Spain | 55-80 | 3454 (62%) | 137-item FFQ  and  dietary  records | (g/d)  1·7-29  56-89  123-185 | Hyperglycemia | 1·00  0·61 (0·43, 0·85) 0·60 (0·42, 0·86) | Age, sex, BMI, dietary intervention group, leisure time physical activity, educational level, smoking, hypertension, or antihypertensive use,  and fasting glucose, HDL-cholesterol, triglyceride concentrations, cumulative average consumption  of dietary variables in energy-adjusted quintiles and alcohol | 5 |
| Grantham et al, 2012 | Cohort | Australia | ≥25 | 5582  (54·9%) | 121-item FFQ | (Servings/d)  T1  (0-1·2)  T2  (>1·2-1·9)  T3  (>1·9-5·8) | Hyperglycemia | 1·00  0·88 (0·62, 1·26)  1·14 (0·78, 1·67) | Age, sex, energy intake, family history of diabetes, education level, level of physical activity, smoking status, triacylglycerol, HDL cholesterol, systolic blood pressure,  WC and hip circumference | 6 |
| Kim  et al,  2013 | Cross- sectional | Korea | ≥19 | 4862 (59%) | FFQ  and  24-h dietary recall | None or rarely  **≤**2-3 per month  **≤**4-6 per week  ≥once per day | Hyperglycemia | 1·00  0·85 (0·72, 1·01) 0·76 (0·63, 0·93) 0·89 (0·64, 1·25) | Age, sex, education level, income, smoking status, BMI, alcohol intake, physical activity, energy intake, fat intake, calcium  intake and fibre intake | 16 |
| Abdominal obesity | 1·00  1·00 (0·79, 1·25) 1·07 (0·83, 1·37) 0·82 (0·53, 1·27) |
| Kiriiet al,  2009 | Cohort | Japan | 40-59 | 59796 (56·7%) | 147-item FFQ  and  dietary  records | (g/d)  0  0·1<60  ≥60 | Hyperglycemia | Men  1·00  1·14 (0·95, 1·37)  1·01 (0·75, 1·36) Women  1·00  0·85 (0·69, 1·05)  0·77 (0·58, 1·01) | Age, area, BMI, family history of diabetes mellitus, smoking status, alcohol intake, history of hypertension, exercise frequency, consumption of coffee, energy-adjusted magnesium and total energy | 6 |
| Liu  et al,  2006 | Cohort | USA | ≥45 | 37183  (100%) | 131-item FFQ  and  1-week dietary records | (Servings)  <1/month  1-3/month 1/week ≥2/week | Hyperglycemia | 1·00  0·98 (0·86, 1·14) 0·94 (0·78, 1·13) 0·82 (0·70, 0·97) | Total energy intake, randomized-treatment assignment, age, family history of diabetes, smoking status, BMI, hypercholesterolemia, hypertension, hormones, physical activity, alcohol consumption, dietary intakes of fibers, total fat, dietary glycemic load, dietary calcium, vitamin D and magnesium | 6 |
| Margolis  et al,  2011 | Cohort | USA | 50-79 | 82076  (100%) | 122-  item FFQ | (Servings)  <1/month  1/month≤3/month  >3/month-<2/week  ≥2/week | Hyperglycemia | 1·00  0·61 (0·41, 0·92) 0·55 (0·37, 0·82) 0·46 (0·31, 0·68) | Age, race/ethnicity, total energy intake, income, education, smoking, alcohol intake, family history of diabetes, use of postmenopausal hormone therapy, systolic blood pressure, diastolic blood pressure, BMI, physical activity, an interaction term between quintiles of yogurt intake and time, dietary glycemic load, dietary total fat,  dietary total fiber and total magnesium | 6 |
| Moslehi  et al,  2016 | Nested case-control | Iran | (Mean age)43·6 | 698  (54·3%) | 168-  item FFQ  and  24-h dietary recall | (Median g/d)  T1 (66)  T2 (167)  T3 (276) | Hyperglycemia | 1·00  0·81 (0·51, 1·28)  0·92 (0·59, 1·42) | Age, sex, date of blood drawn and controlled for family history of diabetes, BMI at baseline, WC at baseline, total energy intake, high blood pressure, high triglyceride, high cholesterol at baseline and BMI change | 6 |
| Soedamah-Muthu  et al, 2013 | Cohort | UK | 35-55 | 4526  (28%) | 114-  item FFQ | (Median g/d)  T1 (0)  T2 (21)  T3 (117) | Hyperglycemia | 1·00  0·93 (0·69, 1·27) 1·04 (0·77, 1·42) | Age, ethnicity, employment grade, smoking, alcohol intake, BMI, physical activity, family history of CHD/hypertension, fruit and vegetables, bread, meat, fish, coffee, tea and total energy intake | 7 |

MetS, metabolic syndrome; FFQ, food-frequency questionnaire; BMI, body mass index; HDL, high-density lipoprotein cholesterol; LDL, low-density lipoprotein cholesterol; WC, waist circumference; Newcastle-Ottawa quality assessment; STROBE, Strengthening the Reporting of Observational Studies in Epidemiology statement.