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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  |
| Alonsoet 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 FFQand24-h dietary recall | (Servings/d)Q1 (<1·7)Q2 (1·7<2·3)Q3 (2·3<3·1)Q4 (≥3·1) | Abdominal obesity | 1·000·94 (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) |
| Babioet al,2015 | Cohort | Spain | 55-80 | 1386 | 137-item FFQ and3-d dietaryrecords | (g/d)T1 (**≤**287)T2(287-449)T3 (≥450) | Abdominal obesity | 1·000·98 (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 | 1·000·86 (0·62, 1·19)0·93 (0·65, 1·33) |
| 3539 | Hypertriglyceridemia | 1·000·70 (0·60, 0·81)0·92 (0·78, 1·08) |
| 3745 | Low HDL cholesterol | 1·000·79 (0·68, 0·91)0·87 (0·74, 1·03) |
| Choi et al, 2005 | Cohort | USA | 40-75 | 41254 (0%) | 130-item FFQand1-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 | 1·000·96 (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 |
| Crichtonet 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 | 1·000·69 (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‑Lópezet al,2016 | Cohort | Spain | 55-80 | 3454 (62%) | 137-item FFQanddietaryrecords  | (g/d)136-243311-376475-617 | Hyperglycemia | 1·000·67 (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 averageconsumption of dietary variables in energy-adjusted quintiles andalcohol  | 5 |
| Drehmeret al,2015 | Cohort | Brazil | 35-74 | 10010(54·3%) | 114-item FFQanddietaryrecords | (Servings/d)<11-2>2-4>4 | Hyperglycemia | 1·000·95 (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 |
| Engberinket al,2009 | Cohort | Netherlands | 20-65 | 21553(54·8%) | 178-item FFQand24-h dietary recall | (Median g/d)Q1 (206)Q2 (359)Q3 (510)Q4 (757) | High blood pressure | 1·001·08 (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 |
| Engberinket 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 | 1·000·82 (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 |
| Fumeronet 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 | 1·000·90 (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 Kaiet al,2014 | Cross- sectional | France | 35-64 | 3017 | 3-ddietaryrecords | (g/1000 kJ)Q1(0-13·2)Q2(13·3-23·1)Q3(23·2-36·3)Q4(36·4-266) | Hyperglycemia | 1·000·64 (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) |
| Heraclideset al,2012 | Cohort | UK | 43-53 | 1750 | 5-ddietaryrecords | (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 FFQanddietaryrecords | (g/d)<5050<150150<300≥300 | Hyperglycemia | Men1·000·99 (0·79, 1·23)1·04 (0·85, 1·28)1·18 (0·90, 1·56)Women1·000·82 (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 |
| Liuet al,2006 | Cohort | USA | ≥45 | 37183(100%) | 131-item FFQand1-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 |
| Louieet 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 | 1·001·29 (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 |
| Margoliset 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 |
| Martinset 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) |
| Moslehiet al,2016 | Nested case-control | Iran | (Mean age)43·6 | 698(54·3%) | 168-item FFQand24-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 Fardet 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 |
| Shinet al,2013 | Cohort | Korea | 40-69 | 5745 | 110-item FFQand3-ddietaryrecords | (Times/week)None12-34-6≥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 | 1·000·86 (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 | 1·001·01 (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 | FFQand24-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-sweetenedsoft 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 | 1·001·24 (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 | 1·001·12 (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-ddietaryrecords and24-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 |
| Wanget al,2015 | Cohort | USA | 28-62  | 6661(58·1%) | 126-item FFQand7-ddietaryrecords | (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≤0·50·5-1>1 | Hyperglycemia | 1·000·86 (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 |  |
| Babioet al,2015 | Cohort | Spain | 55-80 | 1386 | 137-item FFQ and3-d dietaryrecords | (Median g/d)T1 (120)T2 (222)T3 (462) | Abdominal obesity | 1·001·02 (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 | 1·000·84 (0·60, 1·18) 0·81 (0·57, 1·15) |
| 3539 | Hypertriglyceridemia | 1·000·79 (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 FFQand1-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 milk1·00 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 milk1·00 1·05 (0·87, 1·28) 0·97 (0·72, 1·29) 1·19 (1·00, 1·43) |
| Crichtonet 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 milk1·00 0·79 (0·53, 1·16) 0·61 (0·44, 0·86)Low-fat milk1·00 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‑Lópezet al,2016 | Cohort | Spain | 55-80 | 3454 (62%) | 137-item FFQanddietaryrecords | (g/d)39-155200-237335-480 | 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 consumptionof dietary variables in energy-adjusted quintiles and alcohol | 5 |
| Elwoodet al,2007 | Cohort | UK | 45-59 | 2375(0%) | FFQand1-week dietary records | Lowest 1/4Next 1/4Next 1/4Highest 1/4 | Hyperglycemia | 1·000·800·820·57(0·20, 1·63) | BMI | 5 |
| Funtikovaet al,2015 | Cohort | Spain | 25-74 | 2181 | 166-item FFQ | (g/d)No consumption0<200≥200 | Abdominal obesity | Whole milk1·001·38 (1·03, 1·81)1·15 (0·89, 1·47)Skim and low-fat milk1·000·81 (0·55, 1·13)0·90 (0·72, 1·12) | Sex, age, baseline WC, smoking, energy intake, educational level, leisure-time physical activity, modified mediterraneandiet 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 milk1·00 0·85 (0·60, 1·20)0·65 (0·44, 0·94)Full-fat milk1·001·38 (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 |
| Kimet al,2013 | Cross- sectional | Korea | ≥19 | 4862 (59%) | FFQand24-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, calciumintake 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 FFQanddietaryrecords | (g/d)<5050<100100<200≥200 | Hyperglycemia | Men1·001·07 (0·66, 1·72)0·90 (0·71, 1·13)1·02 (0·85, 1·24)Women1·001·29 (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 |
| Kwonet al,2010 | Cross- sectional | Korea | ≥19 | 4890 (58%) | FFQand24-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) |
| Liuet al,2006 | Cohort | USA | ≥45 | 37183(100%) | 131-item FFQand1-week dietary records | (Servings)<1/month 1-3/month 1/week ≥2/week | Hyperglycemia | Skim milk1·00 1·05 (0·86, 1·27) 0·87 (0·69, 1·10) 0·92 (0·78, 1·09)Whole milk1·00 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 |
| Moslehiet al,2016 | Nested case-control | Iran | (Mean age)43·6 | 698(54·3%) | 168-item FFQand24-h dietary recall | (Median g/d)T1 (15)T2 (115)T3 (234) | Hyperglycemia | 1·000·95 (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 |
| Satijaet al,2013 | Cross- sectional | India | ≥18 | 6357(41·8%) | 184-item FFQand24-h dietary recall | (Portions/d)Never<1≥1 | Abdominal obesity | Men1·000·68 (0·52, 0·88)0·71 (0·54, 0·93)Women1·000·94 (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 |
| Shinet al,2013 | Cohort | Korea | 40-69 | 6705 | 110-item FFQand3-ddietaryrecords | (Times/week)None12-34-6≥7 | Hyperglycemia | 1·000·98 (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 | 1·001·01 (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 | 1·001·05 (0·86, 1·28)0·92 (0·75, 1·14)0·94 (0·76, 1·17)0·96 (0·80, 1·14) |
| 5200 |  | Hypertriglyceridemia | 1·001·06 (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 | 1·001·10 (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 | FFQand24-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-sweetenedsoft 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 | 1·001·04 (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 |
| Sunet al,2014 | Cohort | China | ≥50 | 20335(71·2%) | FFQ | (Portions/ week)01-3>3 | Hyperglycemia | 1·000·99 (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 |
| Villegaset al, 2009 | Cohort | China | 40-70 | 64191(100%) | 77-item FFQ and24-h dietary recall | (Median g/d)None<100100-200>200 | Hyperglycemia | 1·000·61 (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 |
| Wanget al,2015 | Cohort | USA | 28-62  | 6661(58·1%) | 126-item FFQand7-ddietaryrecords | (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 | 1·001·03 (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 |  |
| Babioet al,2015 | Cohort | Spain | 55-80 | 1386 | 137-item FFQ and3-d dietaryrecords | Tertile 3 vs Tertile 1 | Abdominal obesity | 0·74 (0·61, 0·91) | Sex, age, leisure time physical activity, BMI, currentsmoker, former smoker and use of hypoglycemic, hypolipidemic,antihypertensive, and insulin treatment at baseline plus mean consumptionduring 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 FFQand1-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 |
| Crichtonet 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 yogurt1·00 0·87 (0·59, 1·28) 0·57 (0·39, 0·85) Low-fat yogurt1·00 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‑Lópezet al,2016 | Cohort | Spain | 55-80 | 3454 (62%) | 137-item FFQanddietaryrecords | (g/d)1·7-2956-89123-185 | 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 consumptionof 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 |
| Kimet al,2013 | Cross- sectional | Korea | ≥19 | 4862 (59%) | FFQand24-h dietary recall | None or rarely**≤**2-3 per month**≤**4-6 per week≥once per day | Hyperglycemia | 1·000·85 (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, calciumintake and fibre intake | 16 |
| Abdominal obesity | 1·001·00 (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 FFQanddietaryrecords | (g/d)00·1<60≥60 | Hyperglycemia | Men1·001·14 (0·95, 1·37) 1·01 (0·75, 1·36) Women1·000·85 (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 |
| Liuet al,2006 | Cohort | USA | ≥45 | 37183(100%) | 131-item FFQand1-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 |
| Margoliset al,2011 | Cohort | USA | 50-79 | 82076(100%) | 122-item FFQ | (Servings)<1/month1/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 |
| Moslehiet al,2016 | Nested case-control | Iran | (Mean age)43·6 | 698(54·3%) | 168-item FFQand24-h dietary recall | (Median g/d)T1 (66)T2 (167)T3 (276) | Hyperglycemia | 1·000·81 (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 | 1·000·93 (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.