**Supplementary Material**

**Individual saturated fatty acid intake and risk of overweight/obesity: findings from population-based nationwide cohort study**

Fei Wu, Lei Mao, Yu Zhang, Xiaoqian Chen, Pan Zhuang, Wenqiao Wang, Jun Wang, Jingjing Jiao\*

**\* Corresponding author.** E-mail address: jingjingjiao@zju.edu.cn (J. Jiao).

**Supplementary Figure 1** Flow chart of participants in the China Health and Nutrition Survey (CHNS)

**Supplementary Table S1** Subgroup analyses of HRs (95% CIs) for the associations between SFA intake and risk of overweight and obesity in the CHNS (*n*=8,465)

**Supplementary Table S2** Sensitivity analyses of HRs (95% CIs) for the associations of TSFAs, MCSFAs, 6:0 and 10:0 intakes with risk of overweight and obesity in the CHNS (*n*=8,465)

**Supplementary Figure 1** Flow chart of participants in the China Health and Nutrition Survey (CHNS)

29,802 participants were eligible between 1989 and 2011 survey in the CHNS

8,763 persons aged <20 years at entry and 8,102 persons without complete dietary data or follow-up were excluded

12,937 adults ≥20 years with complete dietary data and follow-up time were eligible in the CHNS

4,472 persons were excluded:

1. Persons with stroke (n=43)
2. Persons with myocardial infarction (n=26)
3. Women who were pregnant (n=228)
4. Individual BMI ≥24 or was missing at baseline (n=4,175)

8,465 participants (3,968 men and 4,497 women) in the CHNS for analysis

**Supplementary Table S1.** Subgroup analyses of HRs (95% CIs) for the associations between SFA intake and risk of overweight and obesity in the CHNS (*n*=8,465)*a*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Subgroups** | **SFA intake, energy percent per day** | | | | ***P* for trend** | ***P* for interaction*b*** |
| **Q1 (0 to3.71%)** | **Q2 (3.71% to 5.86%)** | **Q3 (5.86% to 8.25%)** | **Q4 (≥ 8.25%)** |
| **Age** |  |  |  |  |  | 0.01 |
| <50 years | 1 | 1.08 (0.97-1.21) | 1.15 (1.00-1.32) | 1.14 (0.96-1.36) | 0.11 |  |
| ≥50 years | 1 | 0.72 (0.42-1.24) | 0.48 (0.25-0.89) | 0.40 (0.18-0.88) | 0.01 |  |
| **Sex** |  |  |  |  |  | 0.04 |
| Male | 1 | 1.08 (0.92-1.27) | 1.22 (1.00-1.49) | 1.21 (0.94-1.56) | 0.10 |  |
| Female | 1 | 1.03 (0.89-1.20) | 1.02 (0.85-1.22) | 1.00 (0.79-1.27) | 0.98 |  |
| **Location** |  |  |  |  |  | 0.43 |
| North | 1 | 1.13 (0.96-1.32) | 1.17 (0.95-1.45) | 1.20 (0.90-1.60) | 0.19 |  |
| South | 1 | 1.02 (0.87-1.21) | 1.09 (0.91-1.32) | 1.05 (0.84-1.32) | 0.57 |  |
| **Urban** |  |  |  |  |  | 0.02 |
| Yes | 1 | 1.67 (1.27-2.18) | 2.02 (1.50-2.70) | 2.19 (1.55-3.10) | <0.001 |  |
| No | 1 | 0.94 (0.83-1.07) | 0.91 (0.78-1.06) | 0.84 (0.69-1.03) | 0.11 |  |
| **Smoking status** |  |  |  |  |  | 0.73 |
| Never | 1 | 1.17 (0.96-1.41) | 1.13 (0.89-1.42) | 1.15 (0.86-1.55) | 0.46 |  |
| Former or current | 1 | 0.94 (0.72-1.23) | 1.17 (0.84-1.63) | 1.03 (0.67-1.57) | 0.63 |  |
| **Alcohol** |  |  |  |  |  | 0.23 |
| Abstainer | 1 | 1.07 (0.95-1.22) | 1.11 (0.96-1.29) | 1.11 (0.92-1.35) | 0.26 |  |
| Drinker | 1 | 0.91 (0.70-1.17) | 1.01 (0.74-1.39) | 0.93 (0.62-1.40) | 0.95 |  |
| **Education** |  |  |  |  |  | 0.35 |
| Below great high school | 1 | 1.06 (0.94-1.20) | 1.09 (0.94-1.26) | 1.05 (0.87-1.28) | 0.53 |  |
| Great high school and above | 1 | 0.99 (0.74-1.31) | 1.11 (0.81-1.53) | 1.16 (0.79-1.70) | 0.35 |  |
| **Physical activity** |  |  |  |  |  | 0.58 |
| Low | 1 | 1.04 (0.88-1.22) | 1.09 (0.90-1.32) | 1.02 (0.81-1.29) | 0.81 |  |
| Moderate and vigorous | 1 | 1.13 (0.96-1.32) | 1.18 (0.96-1.46) | 1.24 (0.94-1.64) | 0.11 |  |
| **Income** |  |  |  |  |  | 0.53 |
| Below median | 1 | 1.01 (0.87-1.18) | 1.01 (0.84-1.22) | 1.06 (0.84-1.34) | 0.67 |  |
| Above median | 1 | 1.12 (0.94-1.33) | 1.22 (1.00-1.50) | 1.15 (0.89-1.49) | 0.25 |  |
| **History of hypertension** |  |  |  |  |  | 0.28 |
| Yes | 1 | 1.30 (0.80-2.09) | 1.22 (0.66-2.28) | 1.56 (0.71-3.44) | 0.36 |  |
| No | 1 | 1.10 (0.93-1.31) | 1.16 (0.95-1.43) | 1.13 (0.87-1.47) | 0.35 |  |

*CI* confidence interval, *HR* hazard ratio, *Q* quartile

*a* HRs and 95% CIs were estimated using Cox proportional hazard regression models. The multivariable-adjusted model was adjusted for age (years), sex, quartiles of household income, educational level (below high school, high school, some college, at least college, or unknown), marital status (single, married, divorced, or unknown), residence (urban or rural), location (north or south), physical activity (no regular activity, low or moderate activity, or vigorous activity), smoking status (never, former, current, or unknown), alcohol intake (abstainer or drinker), baseline hypertension (yes or no), baseline diabetes (yes or no), baseline BMI, intake of total energy, and percentage of energy from dietary protein, PUFAs and MUFAs (all continuous).

*b* *P*-interaction values were calculated by likelihood-ratio tests comparing Cox proportional-hazards models with and without cross-product terms for each level of baselines stratifying variables. *P*-interaction < 0.05 was considered significant.

**Supplementary Table S2.** Sensitivity analyses of HRs (95% CIs) for the associations of TSFAs, MCSFAs, 6:0 and 10:0 intakes with risk of overweight and obesity the in CHNS (*n*=8,465)*a*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Exclude the first 2 years follow-up** | | | **Exclude extreme BMIs (<15 kg/m2)** | | | **Exclude extreme energy intake (<500 or >4000 kcal/day)** | | |
| No. of overweight and obesity (%) | Mulitivariate-adjusted hazard ratio (95% CI) | *P* for trend | No. of overweight and obesity (%) | Mulitivariate-adjusted hazard ratio (95% CI) | *P* for trend | No. of overweight and obesity (%) | Mulitivariate-adjusted hazard ratio (95% CI) | *P* for trend |
| **TSFAs intake, energy percent per day (%)** | 7553 |  |  | 8460 |  |  | 8386 |  |  |
| Q1(0.77-6.13) | 699(37.14) | 1 |  | 775(36.63) | 1 |  | 775(36.66) | 1 |  |
| Q2(6.13-8.33) | 696(38.39) | 1.05 (0.93-1.18) |  | 794(37.52) | 1.06 (0.95-1.18) |  | 793(37.55) | 1.07 (0.96-1.20) |  |
| Q3(8.33-10.73) | 764(40.27) | 1.14 (0.99-1.31) |  | 842(39.81) | 1.10 (0.97-1.26) |  | 838(39.73) | 1.12 (0.97-1.29) |  |
| Q4(≥10.73) | 687(35.03) | 1.10 (0.92-1.32) | 0.20 | 760(35.97) | 1.08 (0.91-1.28) | 0.35 | 737(35.93) | 1.08 (0.90-1.30) | 0.35 |
|  |  |  |  |  |  |  |  |  |  |
| **MCSFAs intake, energy percent per day (%)** |  |  |  |  |  |  |  |  |  |
| Q1(0) | 728(37.53) | 1 |  | 793(37.49) | 1 |  | 779(37.52) | 1 |  |
| Q2(0-0.01) | 699(37.42) | 1.09 (0.97-1.23) |  | 799(37.76) | 1.13 (1.01-1.27) |  | 794(37.74) | 1.11 (0.99-1.25) |  |
| Q3(0.01-0.02) | 735(38.79) | 1.23 (1.07-1.41) |  | 815(38.52) | 1.24 (1.09-1.42) |  | 810(38.48) | 1.23 (1.08-1.40) |  |
| Q4(≥0.02) | 684(36.97) | 1.22 (1.06-1.42) | 0.004 | 764(36.16) | 1.23 (1.07-1.41) | 0.004 | 760(36.17) | 1.21 (1.05-1.40) | 0.007 |
|  |  |  |  |  |  |  |  |  |  |
| **6:0 intake, energy percent per day (%)** |  |  |  |  |  |  |  |  |  |
| C1(0) | 2461(37.49) | 1 |  | 2741(37.39) | 1 |  | 2715(37.37) | 1 |  |
| C2(0-0.001) | 211(41.70) | 0.72 (0.60-0.86) |  | 232(41.06) | 0.71 (0.60-0.83) |  | 230(41.37) | 0.71 (0.60-0.84) |  |
| C3(≥0.001) | 174(36.02) | 0.67 (0.54-0.84) | <0.001 | 198(35.04) | 0.68 (0.56-0.84) | <0.001 | 198(35.11) | 0.68 (0.55-0.84) | <0.001 |
|  |  |  |  |  |  |  |  |  |  |
| **10:0 intake, energy percent per day (%)** |  |  |  |  |  |  |  |  |  |
| C1(0-0.006) | 969(37.84) | 1 |  | 1059(37.55) | 1 |  | 1042(37.54) | 1 |  |
| C2(0.006-0.013) | 932(37.38) | 1.14 (1.02-1.28) |  | 1065(37.74) | 1.18 (1.06-1.31) |  | 1059(37.74) | 1.17 (1.06-1.31) |  |
| C3(≥0.013) | 945(37.82) | 1.24 (1.08-1.43) | 0.002 | 1047(37.15) | 1.25 (1.10-1.42) | <0.001 | 1042(37.16) | 1.24 (1.09-1.41) | 0.002 |

*CI* confidence interval, *HR* hazard ratio, *Q* quartile

*a*HRs and 95% CIs were calculated using Cox proportional hazard regression models. The multivariate-adjusted model used for total SFAs was adjusted for age (years), sex, quartiles of household income, educational level (below high school, high school, some college, at least college, or unknown), marital status (single, married, divorced, or unknown), residence (urban or rural), location (north or south), physical activity (no regular activity, low or moderate activity, or vigorous activity), smoking status (never, former, current, or unknown), alcohol intake (abstainer or drinker), baseline hypertension (yes or no), baseline diabetes (yes or no), baseline BMI, intake of total energy, and percentage of energy from dietary protein, PUFAs and MUFAs (all continuous) and odd chain SFAs (for even chain SFAs).