**Online Supplementary Material**

**Association between dietary fiber intake and asthma (symptoms and control): results from the French national e-cohort NutriNet-Santé**

Roland M. Andrianasolo1, Serge Hercberg1,2, Emmanuelle Kesse-Guyot1, Nathalie Druesne-Pecollo1, Mathilde Touvier1, Pilar Galan1, Raphaëlle Varraso3,4

**Affiliations**: 1 Université Paris 13, Equipe de Recherche en Epidémiologie Nutritionnelle (EREN), Centre d'Epidémiologie et Statistiques Sorbonne Paris Cité, Inserm (U1153), Inra (U1125), Bobigny, France. 2 Département de Santé Publique, Hôpital Avicenne, Bobigny, France. 3 Inserm, U1168, VIMA: Aging and chronic diseases. Epidemiological and public health approaches, F-94807, Villejuif, France. 4 Université Versailles St-Quentin-en-Yvelines, UMR-S 1168, F-78180, Montigny le Bretonneux, France.

**Supplemental Figure 1** Flowchart for inclusion of participants

**Supplemental Table 1** Spearman correlation coefficients between total dietary fiber, types and sources of dietary fiber, among women, NutriNet-Santé cohort

**Supplemental Table 2** Spearman correlation coefficients between total dietary fiber, types and sources of dietary fiber, among men, NutriNet-Santé cohort

**Supplemental Table 3** Associations between quintiles of dietary fiber intake and the asthma symptom score (continuous variable) among women from the NutriNet-Santé study (n=26,640), further adjusted for the mPNNS-GS

**Supplemental Table 4** Associations between quintiles of dietary fiber intake and the asthma symptom score (continuous variable) among men from the NutriNet-Santé study (n=8,740), further adjusted for the mPNNS-GS

**Supplemental Table 5** Associations between quintiles of dietary fiber intake and asthma control test score among women from the NutriNet-Santé study (n=2,094), further adjusted for the mPNNS-GS

**Supplemental Table 6** Associations between quintiles of dietary fiber intake and asthma control test score among men from the NutriNet-Santé study (n=557), further adjusted for the mPNNS-GS

**Supplemental Figure 1** Flowchart for inclusion of participants

NutriNet participants to whom respiratory health questionnaire was sent

n=121,568

Non respondents n= 81.416

Respondents to the respiratory survey

n=40,152

Less than 3 dietary records n=2,122

Respondents with at least 3 dietary records from baseline until 2 years of follow-up

n= 38,030

Energy under reporters n= 2,650

Final sample

n= 35,380

**Supplemental Table 1** Spearman correlation coefficients between total dietary fiber, types and sources of dietary fiber, among women, NutriNet-Santé cohort

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Dietary Fiber** | **Total fiber** | **Soluble fiber** | **Insoluble fiber** | **Cereal fiber** | **Vegetable fiber** | **Fruit fiber** | **Legume fiber** | **Seed fiber** |
| **Total fiber** | 1 |  |  |  |  |  |  |  |
| **Soluble fiber** | 0.83 | 1 |  |  |  |  |  |  |
| **Insoluble fiber** | 0.95 | 0.63 | 1 |  |  |  |  |  |
| **Cereal fiber** | 0.48 | 0.42 | 0.45 | 1 |  |  |  |  |
| **Vegetable fiber** | 0.67 | 0.57 | 0.64 | 0.13 | 1 |  |  |  |
| **Fruit fiber** | 0.66 | 0.72 | 0.54 | 0.14 | 0.34 | 1 |  |  |
| **Legume fiber** | 0.29 | 0.19 | 0.32 | 0.10 | 0.12 | 0.09 | 1 |  |
| **Seed fiber** | 0.28 | 0.21 | 0.28 | 0.08 | 0.13 | 0.16 | 0.18 | 1 |

**Supplemental Table 2** Spearman correlation coefficients between total dietary fiber, types and sources of dietary fiber, among men, NutriNet-Santé cohort

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Dietary Fiber** | **Total fiber** | **Soluble fiber** | **Insoluble fiber** | **Cereal fiber** | **Vegetable fiber** | **Fruit fiber** | **Legume fiber** | **Seed fiber** |
| **Total fiber** | 1 |  |  |  |  |  |  |  |
| **Soluble fiber** | 0.82 | 1 |  |  |  |  |  |  |
| **Insoluble fiber** | 0.95 | 0.62 | 1 |  |  |  |  |  |
| **Cereal fiber** | 0.49 | 0.43 | 0.45 | 1 |  |  |  |  |
| **Vegetable fiber** | 0.65 | 0.54 | 0.62 | 0.13 | 1 |  |  |  |
| **Fruit fiber** | 0.66 | 0.71 | 0.53 | 0.14 | 0.32 | 1 |  |  |
| **Legume fiber** | 0.28 | 0.17 | 0.31 | 0.08 | 0.11 | 0.08 | 1 |  |
| **Seed fiber** | 0.27 | 0.19 | 0.28 | 0.06 | 0.13 | 0.15 | 0.17 | 1 |

**Supplemental Table 3** Associations between quintiles of dietary fiber intake and the asthma symptom score (continuous variable) among women from the NutriNet-Santé study (n=26,640), further adjusted for the mPNNS-GS

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintile 1 | | Quintile 2 | | | Quintile 3 | | Quintile 4 | Quintile 5 | | | P for trend | |
| **Total fiber** | | |  | |  |  | |  | | |  |  | |
| OR (95% CI) | | | 1.00 (ref) | | **0.88 (0.82-0.95)** | **0.86 (0.80-0.93)** | | **0.83 (0.76-0.90)** | | | **0.76 (0.70-0.83)** | **<0.0001** | |
| **Soluble fiber** | | |  | |  |  | |  | | |  |  | |
| OR (95% CI) | | | 1.00 (ref) | | **0.82 (0.77-0.89)** | **0.84 (0.78-0.90)** | | **0.79 (0.73-0.86)** | | | **0.73 (0.67-0.80)** | **<0.0001** | |
| **Insoluble fiber** | | |  | |  |  | |  | | |  |  | |
| OR (95% CI) | | | 1.00 (ref) | | **0.92 (0.86-0.99)** | **0.90 (0.83-0.97)** | | **0.89 (0.82-0.96)** | | | **0.81 (0.74-0.87)** | **<0.0001** | |
| **Cereal fiber** | | |  | |  |  | |  | | |  |  | |
| OR (95% CI) | | | 1.00 (ref) | | **0.88 (0.82-0.95)** | **0.83 (0.77-0.90)** | | **0.85 (0.79-0.91)** | | | **0.83 (0.77-0.90)** | **<0.0001** | |
| **Vegetable fiber** | | |  | |  |  | |  | | |  |  | |
| OR (95% CI) | | | 1.00 (ref) | | **0.89 (0.83-0.96)** | **0.90 (0.84-0.97)** | | **0.92 (0.85-0.99)** | | | **0.87 (0.80-0.94)** | 0.18 | |
| **Fruit fiber** | | |  | |  |  | |  | | |  |  | |
| OR (95% CI) | | | 1.00 (ref) | | **0.93 (0.87-1.00)** | **0.90 (0.84-0.97)** | | **0.84 (0.77-0.91)** | | | **0.77 (0.71-0.85)** | **<0.0001** | |
| **Seed fiber** | | |  | |  |  | |  | | |  |  | |
| OR (95% CI) | | | 1.00 (ref) | | 0.96 (0.89-1.04) | 0.96 (0.88-1.04) | | **0.90 (0.83-0.97)** | | | **0.83 (0.77-0.89)** | **<0.0001** | |
| **Legume fiber** | | |  | |  |  | |  | | |  |  | |
| OR (95% CI) | | | 1.00 (ref) | | 0.97 (0.89-1.05) | 1.02 (0.94-1.11) | | 0.97 (0.90-1.05) | | | 0.95 (0.88-1.02) | 0.12 | |

Model was adjusted for age, smoking and pack-years (among ever smokers), educational level, leisure-time physical activity, total daily energy, allergic rhinitis, and family history of asthma and **mPNNS-GS.**

**Supplemental Table 4** Associations between quintiles of dietary fiber intake and the asthma symptom score (continuous variable) among men from the NutriNet-Santé study (n=8,740), further adjusted for the mPNNS-GS

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintile 1 | | Quintile 2 | | Quintile 3 | | Quintile 4 | | Quintile 5 | | P for trend | |
| **Total fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.91 (0.80-1.05) | | 0.89 (0.77-1.03) | | 0.88 (0.76-1.02) | | **0.73 (0.62-0.86)** | | **0.001** | |
| **Soluble fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.92 (0.81-1.06) | | 0.89 (0.78-1.03) | | 0.90 (0.78-1.04) | | **0.73 (0.62-0.86)** | | **0.001** | |
| **Insoluble fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.93 (0.81-1.06) | | 0.94 (0.82-1.08) | | 0.93 (0.80-1.07) | | **0.81 (0.69-0.94)** | | **0.02** | |
| **Cereal fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.98 (0.86-1.12) | | 0.85 (0.74-0.98) | | 0.87 (0.76-1.00) | | **0.75 (0.65-0.87)** | | **<0.0001** | |
| **Vegetable fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.92 (0.80-1.06) | | 0.88 (0.77-1.01) | | 1.04 (0.90-1.19) | | 0.97 (0.84-1.12) | | 0.81 | |
| **Fruit fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | **0.84 (0.74-0.96)** | | **0.83 (0.72-0.96)** | | **0.77 (0.66-0.90)** | | **0.77 (0.65-0.91)** | | **0.001** | |
| **Seed fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 1.11 (0.96-1.28) | | 1.05 (0.90-1.22) | | 1.14 (0.98-1.32) | | 0.89 (0.77-1.03) | | **0.02** | |
| **Legume fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.98 (0.84-1.13) | | 0.97 (0.83-1.13) | | 0.89 (0.77-1.03) | | 0.90 (0.78-1.04) | | 0.09 | |

Model was adjusted for age, smoking and pack-years (among ever smokers), educational level, leisure-time physical activity, total daily energy, allergic rhinitis, and family history of asthma and **mPNNS-GS.**

**Supplemental Table 5** Associations between quintiles of dietary fiber intake and asthma control test score among women from the NutriNet-Santé study (n=2,094), further adjusted for the mPNNS-GS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Quintile 1 | Quintile 2 | Quintile 3 | Quintile 4 | Quintile 5 | | P for trend |
| **Total fiber** |  |  |  |  | |  |  |
| OR (95% CI) | 1.00 (ref) | 0.99 (0.76-1.27) | 0.93 (0.72-1.21) | 0.78 (0.59-1.04) | | **0.71 (0.53-0.97)** | **0.01** |
| **Soluble fiber** |  |  |  |  | |  |  |
| OR (95% CI) | 1.00 (ref) | 0.86 (0.67-1.11) | 0.85 (0.66-1.11) | 0.94 (0.71-1.25) | | **0.69 (0.50-0.94)** | **0.05** |
| **Insoluble fiber** |  |  |  |  | |  |  |
| OR (95% CI) | 1.00 (ref) | 0.91 (0.71-1.17) | 0.87 (0.67-1.13) | 0.78 (0.59-1.02) | | **0.67 (0.50-0.90)** | **0.01** |
| **Cereal fiber** |  |  |  |  | |  |  |
| OR (95% CI) | 1.00 (ref) | 0.83 (0.64-1.08) | 0.82 (0.63-1.07) | **0.62 (0.48-0.81)** | | 0.77 (0.59-1.01) | **0.04** |
| **Vegetable fiber** |  |  |  |  | |  |  |
| OR (95% CI) | 1.00 (ref) | 0.88 (0.68-1.15) | 0.81 (0.62-1.05) | 0.87 (0.66-1.14) | | 0.81 (0.61-1.07) | 0.19 |
| **Fruit fiber** |  |  |  |  | |  |  |
| OR (95% CI) | 1.00 (ref) | **0.69 (0.53-0.90)** | 0.76 (0.58-1.00) | **0.70 (0.52-0.93)** | | **0.72 (0.53-0.98)** | 0.31 |
| **Seed fiber** |  |  |  |  | |  |  |
| OR (95% CI) | 1.00 (ref) | 0.96 (0.89-1.04) | 0.96 (0.88-1.04) | **0.90 (0.83-0.97)** | | **0.83 (0.77-0.89)** | 0.06 |
| **Legume fiber** |  |  |  |  | |  |  |
| OR (95% CI) | 1.00 (ref) | 0.97 (0.89-1.05) | 1.02 (0.94-1.11) | 0.97 (0.90-1.05) | | 0.95 (0.88-1.02) | **0.004** |

Model was adjusted for age, smoking and pack-years (among ever smokers), educational level, leisure-time physical activity, total daily energy and **mPNNS-GS.**

**Supplemental Table 6** Associations between quintiles of dietary fiber intake and asthma control test score among men from the NutriNet-Santé study (n=557), further adjusted for the mPNNS-GS

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Quintile 1 | Quintile 2 | Quintile 3 | | Quintile 4 | | Quintile 5 | | P for trend | |
| **Total fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.82 (0.49-1.39) | | **0.56 (0.33-0.96)** | | 0.68 (0.39-1.20) | | **0.51 (0.28-0.95)** | | **0.04** | |
| **Soluble fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.68 (0.42-1.12) | | 0.59 (0.33-1.03) | | 0.64 (0.36-1.14) | | **0.50 (0.27-0.96)** | | 0.06 | |
| **Insoluble fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.60 (0.36-1.03) | | 0.63 (0.37-1.07) | | **0.52 (0.30-0.90)** | | 0.60 (0.33-1.10) | | 013 | |
| **Cereal fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.95 (0.56-1.61) | | 0.74 (0.43-1.26) | | 1.00 (0.59-1.70) | | 0.82 (0.48-1.42) | | 0.63 | |
| **Vegetable fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 1.05 (0.63-1.77) | | 0.73 (0.43-1.24) | | 0.69 (0.40-1.19) | | 0.68 (0.39-1.18) | | **0.05** | |
| **Fruit fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.69 (0.41-1.16) | | 0.75 (0.44-1.28) | | **0.55 (0.32-0.95)** | | **0.37 (0.21-0.67)** | | **0.02** | |
| **Seed fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 1.11 (0.96-1.28) | | 1.05 (0.90-1.22) | | 1.14 (0.98-1.32) | | 0.89 (0.77-1.03) | | 0.21 | |
| **Legume fiber** | |  | |  | |  | |  | |  | |  | |
| OR (95% CI) | | 1.00 (ref) | | 0.90 (0.52-1.57) | | 0.75 (0.41-1.37) | | 0.67 (0.38-1.18) | | 0.77 (0.45-1.33) | | 0.22 | |

Model was adjusted for age, smoking and pack-years (among ever smokers), educational level, leisure-time physical activity, total daily energy and **mPNNS-GS.**