Supplementary Material

# Defecation Questionnaire

1. Whether there is recurrent abdominal pain before and after defecation?(Yes/No)
2. Time of symptom onset( years)
3. Frequency of occurrence in the past 3 months( %)
4. Frequency of occurrence in the past 6 months( %)
5. Frequency of occurrence in the past 12 months or more ( %)
6. Weather you have increased bowel movements when abdominal pain occurs?
7. Time of symptom onset( years)
8. Frequency of occurrence in the past 3 months( %)
9. Frequency of occurrence in the past 6 months( %)
10. Frequency of occurrence in the past 12 months or more ( %)
11. Weather you have increased bowel movements when abdominal pain occurs?
12. Time of symptom onset( years)
13. Frequency of occurrence in the past 3 months( %)
14. Frequency of occurrence in the past 6 months( %)
15. Frequency of occurrence in the past 12 months or more ( %)
16. Whether there are the following symptoms occur in defecation?
17. Straining (Yes/No)
18. Time of symptom onset( years)
19. Frequency of occurrence in the past 3 months( %)
20. Frequency of occurrence in the past 6 months( %)
21. Frequency of occurrence in the past 12 months or more ( %)
22. Sensation of incomplete evacuation (Yes/No)
23. Time of symptom onset( years)
24. Frequency of occurrence in the past 3 months( %)
25. Frequency of occurrence in the past 6 months( %)
26. Frequency of occurrence in the past 12 months or more ( %)
27. Sensation of anorectal obstruction/blockage (Yes/No)
28. Time of symptom onset( years)
29. Frequency of occurrence in the past 3 months( %)
30. Frequency of occurrence in the past 6 months( %)
31. Frequency of occurrence in the past 12 months or more ( %)
32. Manual maneuvers to facilitate (Yes/No)
33. Time of symptom onset( years)
34. Frequency of occurrence in the past 3 months( %)
35. Frequency of occurrence in the past 6 months( %)
36. Frequency of occurrence in the past 12 months or more ( %)
37. The number of spontaneous bowel movements per week
38. In the past 3 months( )
39. In the past 6 months( )
40. In the past 12 months or more( )
41. Distribution of the fecal forms according to **Bristol Stool Scale**
42. In the past 3 months: Type 1( %), Type 2( %), Type 3( %), Type 4( %), Type 5( %), Type 6( %) Type 7( %)
43. In the past 6 months: Type 1( %), Type 2( %), Type 3( %), Type 4( %), Type 5( %), Type 6( %) Type 7( %)
44. In the past 12 months or more: Type 1( %), Type 2( %), Type 3( %), Type 4( %), Type 5( %), Type 6( %) Type( %)
45. Frequency of loose stools in defecation without using laxatives
46. In the past 3 months( %)
47. In the past 6 months( %)
48. In the past 12 months or more( %)

# Supplementary Tables

**Table 1** Characteristics of the study population (n=11,743)

|  |  |
| --- | --- |
| **Variable** | **Median ( IQR) or n (%)** |
| Age , (years) | 73(69~78) |
| Sex |  |
| Male | 5167(44.0) |
| Female | 6576(56.0) |
| Marital status |  |
| Single | 114(1.0) |
| Married | 8854(75.4) |
| Divorced/widowed | 2775(23.6) |
| Residence location |  |
| Urban | 4471(38.1) |
| Rural | 7272(61.9) |
| Education level , (years) | 6(3~9) |
| Illiterate | 2413(20.5) |
| Primary school | 5347(45.5) |
| Middle school and above | 3983(33.9) |
| Live alone |  |
| Yes | 1362(11.6) |
| No | 10381(88.4) |
| Smoking\* |  |
| Yes | 2948(25.1) |
| No | 8795(74.9) |
| Alcohol consumption\*\* |  |
| Yes | 2632(22.4) |
| No | 9111(77.6) |
| Hypertension |  |
| Yes | 5246(44.7) |
| No | 6497(55.3) |
| Diabetes mellitus |  |
| Yes | 1700(14.5) |
| No | 10043(85.5) |
| Stroke/TIA |  |
| Yes | 1457(12.4) |
| No | 10286(87.6) |
| Cerebral hemorrhage |  |
| Yes | 201(1.7) |
| No | 11542(98.3) |
| Headache |  |
| Yes | 607(5.2) |
| No | 11136(94.8) |
| Heart disease  |  |
| Yes | 1855(15.8) |
| No | 9888(84.2) |
| MMSE score | 26(21~28) |
| ADL score | 20(20~22) |
| CDR score | 0(0~0.5) |

TIA, transient ischemic attack; MMSE, Mini-Mental State Examination; CDR, clinical dementia rating; ADL ,activities of daily living; IQR: Inter quartile range. \*Smoking was defined as having smoked at least 400 cigarettes. \*\*Alcohol consumption was defined as drinking at least 0.1 drink per day for 1 year or more, with one drink equal to 10 g pure alcohol.

**Table 2** Prevalence of constipation (n=11,743)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  **% (95% CI)** | **χ2** | **P** |
| Overall |  |  |  |
|  Crude | 15.2(14.6~15.8) |  |  |
|  Standardized\* | 14.8(14.6~15.0) |  |  |
| Age (years) |  |  |  |
|  65-69 | 12.3(11.2~13.4)b,c | 85.5 | **<0.001** |
|  70-74 | 14.0(12.9-15.2)e |
|  75-79 | 15.7(14.2-17.3)f |
|  >=80 | 20.7(19.1-22.3) |
| Sex |  |  |  |
|  Male | 14.1(13.2-15.1) | 8.23 | **0.004** |
|  Female | 16.0(15.2-16.9) |
| Residence location |  |  |  |
|  Urban | 12.7(11.7-13.7) | 35.54 | **<0.001** |
|  Rural | 16.7(15.9-17.6) |
| Cognitive function |  |  |  |
|  normal | 13.8(13.0-14.6)g,h | 45.51 | **<0.001** |
|  a-MCI | 14.4(12.8-15.9)i,j |
|  na-MCI | 19.1(16.8-21.5) |
|  dementia | 19.2(17.3-21.0) |

Results are shown as n (%) for the chi-square tests.Statistical significance in different age groups(P< 0.05):a, 65-69 vs. 70-74; b, 65-69 vs. 75-79; c, 65-69 vs. >=80; d, 70-74 vs. 75-79; e, 70-74 vs. >=80; f, 75-79 vs. >=80. Statistical significance in different cognitive status(P< 0.05): g, normal vs. na-MCI; h, normal vs. dementia; i, a-MCI vs. na-MCI; j, a-MCI vs. Dementia. \*Adjusted, for age and sex location. CI: Confidence interval. a-MCI: amnestic mild cognitive impairment. na-MCI: non-amnestic mild cognitive impairment. Bold values indicate statistical significance.

**Table 3** Characteristics of the study population by cognitive function (n=11,743)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Normal****n= 6915** | **a-MCI****n= 1998** | **na-MCI****n=1118** | **Dementia****n=1712** | **χ2/Z** | **P** |
| Age, (years), median(IQR) | 72(68~76)a,b,c | 73(69~79)d,e | 73(69~78)f | 77(71.0~84) | 455.9 | <0.001 |
| Sex, n (%) |  |  |  |  |  |  |
| Male | 3137(45.4)b,c | 910(45.5)d,e | 582(52.1)f | 538(31.4) | 146.5 | <0.001 |
| Female | 3778(54.6)b,c | 1088(54.5)d,e | 536(47.9)f | 1174(68.6) |
| Marital status, n (%) |  |  |  |  |  |  |
| Single | 48(0.7)d | 21(1.1) | 13(1.2) | 32(1.9) | 225.4 | <0.001 |
| Married | 5470(79.1)a,d | 1476(73.9)e | 848(75.8)f | 1060(61.9) |
| Divorced/widowed | 1397(20.2)a,d | 501(25.1)e | 257(23.0)f | 620(36.2) |
| Residence location, n (%) |  |  |  |  |  |  |
| Urban | 2846(41.2)a,b,c | 918(45.9)d,e | 303(27.1) | 404(23.6) | 289.6 | <0.001 |
| Rural | 4069(58.8)a,b,c | 1080(54.1)d,e | 815(72.9) | 1308(76.4) |
| Education level , (years), median(IQR) | 6(5~9)a,b,c | 6(4~9)d,e | 6(4~9)f | 3(0~6) | 596.4 | <0.001 |
| Illiterate | 1294(18.7)a,b,c | 274(13.7)e | 152(13.6)f | 693(40.5) | 611.3 | <0.001 |
| Primary school | 3036(43.9)a,b | 985(49.3)d,e | 631(56.4)f | 695(40.6) |
| Middle school and above | 2585(37.4)b,c | 739(37.0)d,e | 335(30)f | 324(18.9) |
| Live alone, n (%) |  |  |  |  |  |  |
| Yes | 742(10.7)a,c | 266(13.3) | 123(11.0) | 231(13.5) | 17.2 | 0.001 |
| No | 6173(89.3)a,c | 1732(86.7) | 995(89.0) | 1481(86.5) |
| Smoking\*, n (%) |  |  |  |  |  |  |
| Yes | 1763(25.5)b,c | 493(24.7)d,e | 384(34.3)f | 308(18.0) | 97.6 | <0.001 |
| No | 5152(74.5)b,c | 1505(75.3)d,e | 734(65.7)f | 1404(82.0) |
| Alcohol consumption\*\*, n (%) |  |  |  |  |  |  |
| Yes | 1618(23.4)b,c | 419(21.0)d,e | 341(30.5)f | 254(14.8) | 104.8 | <0.001 |
| No | 5297(76.6)b,c | 1579(79.0)d,e | 777(69.5)f | 1458(85.2) |
| Hypertension, n (%) |  |  |  |  |  |  |
| Yes | 3216(46.5)a,b,c | 847(42.4) | 455(40.7) | 728(42.5) | 24.0 | <0.001 |
| No | 3699(53.5)a,b,c | 1151(57.6) | 663(59.3) | 984(57.5) |
| Diabetes mellitus, n (%) |  |  |  |  |  |  |
| Yes | 970(14.0) | 315(15.8) | 158(14.1) | 257(15.0) | 4.3 | 0.230 |
| No | 5945(86.0) | 1683(84.2) | 960(85.9) | 1455(85.0) |
| Stroke/TIA, n (%) |  |  |  |  |  |  |
| Yes | 750(10.8)a,b,c | 31(1.6)d,e | 369(33.0)f | 307(17.9) | 716.7 | <0.001 |
| No | 6165(89.2)a,b,c | 1967(98.4)d,e | 749(67.0)f | 1405(82.1) |
| Cerebral hemorrhage, n (%) |  |  |  |  |  |  |
| Yes | 75(1.1)b,c | 12(0.6)d,e | 45(4.0) | 69(4.0) | 121.0 | <0.001 |
| No | 6840(98.9)b,c | 1986(99.4)d,e | 1073(96.0) | 1643(96.0) |
| Headache, n (%) |  |  |  |  |  |  |
| Yes | 322(4.7)b,c | 97(4.9) | 75(6.7) | 113(6.6) | 16.7 | 0.001 |
| No | 6593(95.3)b,c | 1901(95.1) | 1043(93.3) | 1599(93.4) |
| Heart disease , n (%) |  |  |  |  |  |  |
| Yes | 1036(15.0)b | 314(15.7) | 205(18.3) | 300(17.5) | 12.4 | 0.005 |
| No | 5879(85.0)b | 1684(84.3) | 913(81.7) | 1412(82.5) |
| MMSE score, median(IQR) | 28(26~29)a,b,c | 23(21~25)e | 23(21~25)f | 14(10~16) | 7150.4 | <0.001 |
| ADL score, median(IQR) | 20(20~20)a,b,c | 20(20~21)e | 20(20~22)f | 34(30~47) | 6547.1 | <0.001 |
| CDR score, median(IQR) | 0a,b,c | 0.5e | 0.5f | 2(2~2) | 11703.6 | <0.001 |

Results are shown as n (%) for the chi-square tests and as the median(IQR) for Kruskal-Wallis test. TIA, transient ischemic attack; MMSE, mini-mental state examination; CDR, clinical dementia rating; ADL ,activities of daily living; IQR, inter quartile range. a, P < 0.05 normal vs. a-MCI; b, P < 0.05 Normal vs. na-MCI; c, P < 0.05 Normal vs. Dementia; d, P < 0.05 a-MCI vs. na-MCI; e, P < 0.05 a-MCI vs. Dementia; f, P < 0.05 na-MCI vs. Dementia. \*Smoking was defined as having smoked at least 400 cigarettes. \*\*Alcohol consumption was defined as drinking at least 0.1 drink per day for 1 year or more, with one drink equal to 10 g pure alcohol