

# Association Between Cumulative Rome IV Constipation Symptom Burden And Mobility related Functional Outcomes in Older Adults

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## Introduction

This study aimed to investigate whether increasing cumulative Rome IV constipation symptom burden is associated with poorer functional performance, reduced walking capacity, and greater sedentary behavior in community dwelling older adults.

## Methods

A total of 208 older adults were included in this clinical, non-surgical cross-sectional study. Demographic characteristics, body mass index (BMI), 6-minute walk test (6MWT) distance, 5 times sit to stand test (5xSTS) time, daily sitting time, total physical activity level, weekly defecation frequency, and spontaneous bowel movements were recorded. Constipation symptom burden was operationalized as the cumulative number of fulfilled core Rome IV constipation criteria (0–6). Participants were also categorized into three groups according to symptom burden: 0 criteria, 1 criterion, and  $\geq 2$  criteria. Associations between Rome IV criteria count and functional and activity related variables were assessed using spearman correlation analysis. Between group comparisons were performed using the Kruskal-Wallis test with Bonferroni-adjusted pairwise Wilcoxon tests. To examine the independent association of symptom burden with functional outcomes, multivariable linear regression models were constructed for 6MWT distance, 5xSTS time, sitting time, and total physical activity, adjusted for age, sex, and BMI. Item level models were additionally performed for individual Rome IV symptoms, and a leave one item out sensitivity analysis was conducted by recalculating the cumulative symptom burden after excluding straining. The available sample exceeded the minimum required size for between group comparisons based on an a priori power calculation.

## Results

The mean age of the participants was  $69.78 \pm 5.16$  years, and 47.1% were women. According to cumulative Rome IV criteria count, 110 participants had 0 criteria, 36 had 1 criterion, and 62 had  $\geq 2$  criteria. Higher criteria count correlated with shorter 6MWT distance ( $\rho = -0.730$ ,  $p < 0.001$ ), longer 5xSTS time ( $\rho = 0.736$ ,  $p < 0.001$ ), greater sitting time ( $\rho = 0.424$ ,  $p < 0.001$ ), and lower total physical activity ( $\rho = -0.472$ ,  $p < 0.001$ ). Significant between-group differences were observed for 6MWT ( $\chi^2 = 109.92$ ,  $p < 0.001$ ), 5xSTS ( $\chi^2 = 109.44$ ,  $p < 0.001$ ), sitting time ( $\chi^2 = 38.43$ ,  $p < 0.001$ ), and total physical activity ( $\chi^2 = 47.88$ ,  $p < 0.001$ ). In adjusted linear regression analyses, each additional Rome IV criterion was associated with an 18.2 m lower 6MWT distance ( $\beta = -18.20$ , 95% CI -22.8 to -13.6,  $p < 0.001$ ), a 0.86 s longer 5xSTS time ( $\beta = 0.862$ , 95% CI 0.660 to 1.06,  $p < 0.001$ ), a 21.0 min/day greater sitting time ( $\beta = 21.0$ , 95% CI 11.3 to 30.7,  $p < 0.001$ ), and a 117 MET-min/week lower total physical activity level ( $\beta = -117$ , 95% CI -180 to -52.9,  $p < 0.001$ ). Item level analyses identified incomplete evacuation, straining, and hard/lumpy stools as the symptoms most consistently associated with poorer functional performance. In the leave one item out sensitivity analysis excluding straining, the cumulative criteria count remained independently associated with all outcomes (all  $p < 0.001$ ).

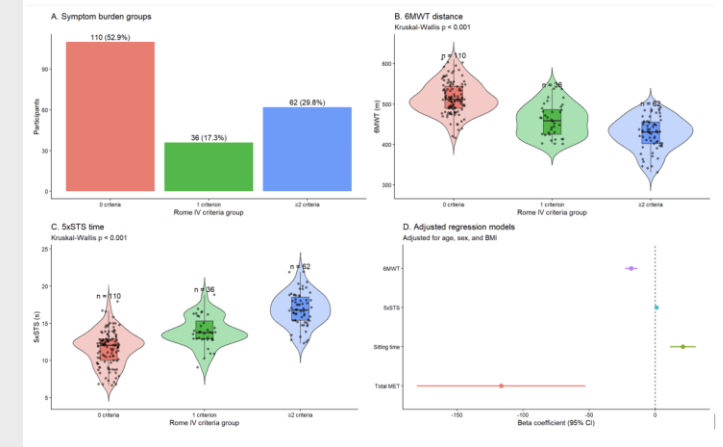
**Table 1. Baseline characteristics and bowel-related variables according to cumulative Rome IV criteria groups**

| Variable                    | Overall             | 0 criteria           | 1 criterion         | $\geq 2$ criteria   | P value    |
|-----------------------------|---------------------|----------------------|---------------------|---------------------|------------|
| Sex                         |                     |                      |                     |                     | <0.001     |
|                             | Male                | 110 (52.9%)          | 75 (68.2%)          | 16 (44.4%)          | 19 (30.6%) |
|                             | Female              | 98 (47.1%)           | 35 (31.8%)          | 20 (55.6%)          | 43 (69.4%) |
| Age (years)                 | $69.78 \pm 5.16$    | $67.64 \pm 3.51$     | $70.28 \pm 3.04$    | $73.31 \pm 6.46$    | <0.001     |
| BMI (kg/m <sup>2</sup> )    | $29.54 \pm 5.41$    | $27.06 \pm 5.10$     | $31.31 \pm 4.21$    | $32.93 \pm 4.24$    | <0.001     |
| 6MWT (m)                    | $478.61 \pm 56.80$  | $515.08 \pm 40.44$   | $458.83 \pm 39.37$  | $425.39 \pm 40.35$  | <0.001     |
| 5xSTS (s)                   | $13.59 \pm 3.21$    | $11.64 \pm 2.34$     | $13.87 \pm 2.04$    | $16.87 \pm 2.22$    | <0.001     |
| Sitting time (min/day)      | $413.60 \pm 89.51$  | $379.99 \pm 84.66$   | $443.28 \pm 73.12$  | $455.98 \pm 83.26$  | <0.001     |
| Total MET (MET-min/week)    | $868.82 \pm 602.53$ | $1133.05 \pm 637.08$ | $570.28 \pm 353.72$ | $573.39 \pm 409.54$ | <0.001     |
| Weekly defecation frequency | $6.24 \pm 2.03$     | $7.84 \pm 0.96$      | $5.72 \pm 0.45$     | $3.69 \pm 0.92$     | <0.001     |
| Spontaneous bowel movements | $6.12 \pm 2.29$     | $7.84 \pm 0.96$      | $5.72 \pm 0.45$     | $3.29 \pm 1.56$     | <0.001     |

Data are presented as mean  $\pm$  standard deviation or n (%). P values were obtained using the Kruskal-Wallis test for continuous variables and the chi-square test for sex.

**Figure 1. Cumulative Rome IV symptom burden and mobility-related functional outcomes in older adults.**

(A) Distribution of cumulative Rome IV symptom burden groups. (B) 6MWT distance across 0-, 1-, and  $\geq 2$ -criteria groups. (C) 5xSTS time across 0-, 1-, and  $\geq 2$ -criteria groups. (D) Adjusted beta coefficients and 95% confidence intervals for the association between cumulative Rome IV criteria count and mobility-related outcomes from multivariable linear regression models adjusted for age, sex, and BMI.



## Clinical Implications

Increasing cumulative Rome IV symptom burden was consistently associated with poorer lower-extremity functional performance, reduced walking capacity, and a more sedentary lifestyle in older adults. The persistence of these associations after exclusion of the straining item suggests that the findings were not driven by a single dominant symptom, but rather reflect a broader constipation-related symptom burden.

## Conclusion

Higher cumulative Rome IV symptom burden is independently associated with impaired functional performance and greater sedentary behavior in older adults. Functional assessment may provide clinically relevant information when evaluating older adults with bowel evacuation dysfunction symptoms, and cumulative symptom burden may help identify individuals with a less favorable mobility profile.

## References

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