Researchers show that age, sex and BMI are significantly associated with bowel movement frequency

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Everybody poops, but not every day. New research by the Institute for Systems Biology (ISB) suggests bowel movement frequency is linked to
An ISB-led research team examined the clinical, lifestyle, and multi-omic data of more than 1,400 healthy adults. How often people poop, they found, can have a large influence on one's physiology and health. Their findings are published in *Cell Reports Medicine* on July 16.

Researchers explored data from consenting participants of the consumer wellness company Arivale. The team focused on generally healthy adults and excluded those with certain health conditions or medication use.

The research team categorized self-reported bowel movement frequency into four groups: constipation (one or two bowel movements per week), low-normal (between three and six bowel movements per week), high-normal (between one and three bowel movements per day), and diarrhea.

Once categorized, the team looked for associations between bowel movement frequency and factors including demographics, genetics, gut microbiome, blood metabolites, and plasma chemistries.

The study showed that age, sex, and body mass index (BMI) were significantly associated with bowel movement frequency. Specifically, younger people, women, and those with a lower BMI tended to have less frequent bowel movements.

"Prior research has shown how bowel movement frequency can have a big impact on gut ecosystem function," said Johannes Johnson-Martinez, the lead author of the study.

"Specifically, if stool sticks around too long in the gut, microbes use up all of the available dietary fiber, which they ferment into beneficial short-chain fatty acids. After that, the ecosystem switches to fermentation of proteins, which produces several toxins that can make their way into the long-term health.
Indeed, the researchers also showed that the microbial composition of study participants' gut microbiomes was a telltale sign of bowel movement frequency.

Fiber-fermenting gut bacteria, often associated with health, appeared to thrive in a "Goldilocks zone" of bowel movement frequency, where people pooped between one to two times per day. However, bacteria associated with protein fermentation or the upper gastrointestinal tract tended to be enriched in those with constipation or diarrhea, respectively.

Similarly, several blood metabolites and plasma chemistries showed significant associations with bowel movement frequency, suggesting potential links between bowel health and chronic disease risk.

Specifically, microbially derived protein fermentation byproducts known to cause damage to the kidneys, like p-cresol-sulfate and indoxyl-sulfate, were enriched in the blood of individuals reporting constipation, while clinical chemistries associated with liver damage were elevated in individuals reporting diarrhea.

Blood levels of indoxyl-sulfate, in particular, were significantly associated with reduced kidney function, providing preliminary support for a causal link between bowel movement frequency, gut microbial metabolism, and organ damage in this healthy cohort.

Unsurprisingly, those who reported eating a fiber-rich diet, better hydration, and regular exercise tended to find themselves in the bowel movement Goldilocks zone.

"Chronic constipation has been associated with neurodegenerative
disorders and with chronic kidney disease progression in patients with active disease," said Dr. Sean Gibbons, ISB associate professor and corresponding author of the paper.

"However, it has been unclear whether or not bowel movement abnormalities are early drivers of chronic disease and organ damage, or whether these retrospective associations in sick patients are merely a coincidence.

"Here, in a generally healthy population, we show that constipation, in particular, is associated with blood levels of microbially derived toxins known to cause organ damage, prior to any disease diagnosis," Gibbons said.

The study also explored associations between bowel movement frequency and anxiety and depression, indicating that mental health history is connected to how often one poops.

"Overall, this study shows how bowel movement frequency can influence all body systems, and how aberrant bowel movement frequency may be an important risk factor in the development of chronic diseases," Gibbons said.

"These insights could inform strategies for managing bowel movement frequency, even in healthy populations, to optimize health and wellness."

Provided by Institute for Systems Biology

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