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File: ■ Pomegranate (*Punica granatum*, Lythraceae)
■ Gut Microbiota
■ Phenolic Compounds

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RE: Pomegranate Juice Intake May Have Beneficial Effects on Gut Microbiota

Mosele JI, Gosalbes M-J, Macià A, et al. Effect of daily intake of pomegranate juice on fecal microbiota and feces metabolites from healthy volunteers. *Mol Nutr Food Res*. 2015;59(10):1942-1953.

Studies have suggested that the gut microbiota is intrinsically linked to the health of an individual. Animal studies have indicated that dietary components, such as phenolic compounds, can improve the gut microbiome and thereby colonic health. The aim of this dietary intervention was to evaluate how polyphenolic-rich pomegranate (*Punica granatum*, Lythraceae) juice (PJ) intake affects metabolic and microbial profiles of feces obtained from healthy adults.

The pomegranate fruits (Mollar de Elche cultivar) used in this study were purchased from a local market in Lleida, Spain. The arils of the fruits (seeds and pulp) were blended to make unfiltered PJ. A total of 12 healthy adults (4 men and 8 women, aged 26-40; body mass index < 25kg/m^2) who were in good health and had not taken antibiotics for at least 3 months before the study or consumed any probiotics were included. Subjects were instructed to maintain their regular diet during the study and complete a 3-day dietary record before and during the 4 weeks of the supplementation period. Phenolic content and dietary composition were also estimated. Subjects consumed 200 mL (968 mg of phenolic compounds) per day of PJ with breakfast for 4 weeks. Stool samples were obtained in fasting subjects before and at the end of the study. Phenolic metabolites, short-chain fatty acids, and steroids were evaluated in the fecal samples, along with biodiversity, interactions, functional predictions, and the composition of the microbiota.

In the fecal samples, there were 5 different types of urolithins (a type of phenolic metabolite) detected in variable concentrations among different individuals. Among these compounds, urolithin A was the most prevalent after PJ consumption (present in 8 out of 12 subjects; $P<0.05$). Urolithin C (trihydroxy-urolithin) also was detected in the feces of 6 subjects. Other urolithins were less prevalent, and 3 subjects had no urolithins detected. There were significantly higher amounts of the following specific phenolic acids after PJ consumption: 3-phenylpropionic acid ($P<0.05$), catechol ($P<0.01$), and

hydroxytyrosol (P<0.05). In terms of anthocyanins, cyanidin 3-*O*-glucoside was present in the majority of subjects. An unknown compound also was detected in all subjects post-intervention. There was a nonsignificant increase in primary bile acid and a significant increase of cholesterol detected in the feces after the intervention (P<0.05).

The intervention did not have any effect on bacterial composition by the end of the study. Catechol was found to be positively correlated with the *Oscillospira* genus and negatively correlated with the *Paraprevotella* genus, whereas 3-phenylpropionic acid showed a positive correlation with the *Odoribacter* genus. All 3 genera were significantly increased after 4 weeks of supplementation with PJ (P<0.05). In terms of functional predictions, 7 pathways were identified that were involved in catechol synthesis for both *Oscillospira* spp. and *Paraprevotella* spp. In contrast, only the phenylalanine metabolism pathway appeared to be linked to *Odoribacter* spp.

In conclusion, 4 weeks of supplementation with PJ did not significantly alter microbiota composition in this trial. The authors state that these effects are in contrast to how pomegranate intake affected the gut microbiota in rats, but are consistent with a study that had subjects consume probiotic-enriched yogurt.[1] The increases in 3 bacteria genera and phenolics, and their relationship with one another, suggest that PJ may have some beneficial effects on gut microbiota that may not be obvious in healthy individuals. Likewise, these data are not fully aligned with recent work published by Li et al.[2] These clinical data demonstrate that pomegranate extract induced changes in the microbiota in healthy subjects. Additionally, data demonstrated that urolithin formation could be induced in a subpopulation of subjects who presented as non-urolithin producers at baseline, suggesting functional biome change with polyphenol consumption. Larger trials should assess short-term and long-term effects of PJ consumption and its relevance in preventing or treating digestive tract diseases.

—Laura M. Bystrom, PhD

Reference

[1]Bartram HP, Scheppach W, Gerlach S, Ruckdeschel G, Kelber E, Kasper H. Does yogurt enriched with *Bifidobacterium longum* affect colonic microbiology and fecal metabolites in health [*sic*] subjects? *Am J Clin Nutr*. 1994;59(2):428-432.

[2]Li Z, Henning SM, Lee R-P, et al. Pomegranate extract induces ellagitannin metabolite formation and changes stool microbiota in healthy volunteers. *Food Funct*. 2015;6(8):2487-2495.

The American Botanical Council has chosen not to include the original article.