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Editorial II

Prebiotic potential of gum Arabic for gut health

Ahmed A. M. Elnour[1,2]*, Nour Hamid Abdurahman[1,2], Khalid Hamid Musa[3], Zafar Rasheed[4]

[1]Faculty of Chemical and Process Engineering Technology, University Malaysia Pahang Al-Sultan Abdullah, Gambang, Malaysia, [2]Centre of Excellence for Advanced Research in Fluid Flow, University Malaysia Pahang Al-Sultan Abdullah, Gambang, Malaysia, [3]Department of Food Science and Human Nutrition, College of Agriculture and Veterinary Medicine, Qassim University, Buraidah, Kingdom of Saudi Arabia, [4]Department of Pathology, College of Medicine, Qassim University, Buraidah, Kingdom of Saudi Arabia

Address for correspondence:
Ahmed A. M. Elnour, Faculty of Chemical and Process Engineering Technology, University Malaysia Pahang Al-Sultan Abdullah, Gambang, Malaysia.
E-mail: adamhassan@umpsa.edu.my

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Gum Arabic (GA), or Gum Acacia, is a natural polysaccharide extensively employed as a food additive and stabilizer, deriving its origin from the exudates of Acacia trees.[1] Although traditionally prized for its emulsifying, thickening, and stabilizing attributes in the food and beverage industry,[2] research has highlighted GA's potential health benefits, especially as a prebiotic in the human gut.[3,4] The human gut microbiome, an intricate ecosystem of trillions of microorganisms, including bacteria, fungi, and viruses, helps to preserve overall health.[5] A well-balanced, diverse microorganism community in the gut is essential,[6] as disturbances in the microbiome have been linked to several health complications, such as inflammatory bowel disease, obesity, and mental health disorders.[7,8] Thus, GA, traditionally a food ingredient, exhibits potential as a health-promoting prebiotic in the human gut.

Prebiotics, distinct from probiotics, are dietary fibers selectively fermented by beneficial gut bacteria, enhancing their growth and activity.[9] As a result, short-chain fatty acids (SCFAs) are produced in the large intestine instead of being digested in the small intestine. A combination of these SCFAs improves gut barrier function, reduces inflammation, and improves immune response.[10] The potential prebiotic properties of GA have been demonstrated.[11] Beneficial gut bacteria such as *Bifidobacterium* and *Lactobacillus* are encouraged, and harmful bacteria such as *Clostridium* are inhibited.[12] GA has also been found to have antioxidant,[13] anti-inflammatory,[14] and immunomodulatory properties, which make it a viable agent for promoting gut health.[12] Thus, GA's prebiotic properties suggest a potential for improving gastrointestinal health.

This editorial letter examines the prebiotic potential of GA in the human gut, examining the literature on its influence on gut microbiota composition, function, and health benefits.[3] As part of our exploration of GA's prebiotic mechanisms, we examine its resistance to digestion in the small intestine and its fermentation by gut bacteria in the large intestine.[12] As a prebiotic, GA has potential applications and challenges in various sectors, including food, beverage, pharmaceuticals, and nutraceuticals, as well as solutions to these challenges.[15] As a prebiotic supplement, GA also shows promise in clinical trials, but further study is necessary to maximize its benefits.[16,17] Therefore, it believes GA shows promising prebiotic potential but requires further research for optimization.

We also emphasize the importance of standardized methods for measuring prebiotic activity, regulatory oversight, and increased consumer and health-care professional education on prebiotics' benefits and role in maintaining a healthy gut microbiome. Since GA does not break down in the large intestine, it is a non-digestible carbohydrate or fiber.[18] It ferments slowly into SCFAs, particularly propionic acid, by intestinal bacteria. GA, a dietary fiber with a bifidogenic effect, increases the proportion of lactic acid bacteria and bifidobacteria in healthy subjects.[19] Augmenting stool water content also increases stool output.[12] Intestinal tolerance to GA has also been excellent, with high daily doses consumed without adverse intestinal reactions.[20] Hence, it underscores standardized evaluation, education, and GA's beneficial prebiotic impact.

Acacia gum has shown prebiotic potential at a 10 g/day dose.[21] Studies have investigated the fermentability of *Acacia sengal*, identifying Prevotella ruminicola as a predominant bacterium in the fermentation process.[22] By providing energy for intestinal bacteria to uptake ammonia as a nitrogen source, this bacterium, an ordinary member of the human intestinal microbiota, suggests that GA can reduce luminal ammonia concentrations in the large intestine. This may benefit patients with renal and hepatic diseases.[20] In summary, GA holds excellent promise as a natural prebiotic, potentially offering numerous health benefits. Further research is required to comprehensively understand its prebiotic mechanisms and optimize its applications across various industries. GA could be essential in promoting gut health and preventing disease as we continue to learn more about the human gut microbiome.

Authors' Contributions

AAME, NHA, and KHM designed the study, performed literature searched, and manuscript drafting. ZR performed a manuscript revision. All authors approved the final manuscript for publication.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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