The Interplay of Dietary Fibers and Intestinal Microbiota Affects Type 2 Diabetes by Generating Short-Chain Fatty Acids

Abstract: Foods contain dietary fibers which can be classified into soluble and insoluble forms. The nutritional composition of fast foods is considered unhealthy because it negatively affects the production of short-chain fatty acids (SCFAs). Dietary fiber is resistant to digestive enzymes in the gut, which modulates the anaerobic intestinal microbiota (AIM) and fabricates SCFAs. Acetate, butyrate, and propionate are dominant in the gut and are generated via Wood–Ljungdahl and acrylate pathways. In pancreatic dysfunction, the release of insulin/glucagon is impaired, leading to hyperglycemia. SCFAs enhance insulin sensitivity or secretion, beta-cell function, leptin release, mitochondrial function, and intestinal gluconeogenesis in human organs, which positively affects type 2 diabetes (T2D). Research models have shown that SCFAs either enhance the release of peptide YY (PYY) and glucagon-like peptide-1 (GLP-1) from L-cells (entero-endocrine), or promotes the release of leptin hormone in adipose tissues through G-protein receptors GPR-41 and GPR-43. Dietary fiber is a component that influences the production of SCFAs by AIM, which may have beneficial effects on T2D. This review focuses on the effectiveness of dietary fiber in producing SCFAs in the colon by the AIM as well as the health-promoting effects on T2D.

Keywords: dietary fibers; intestinal microbiota; short-chain fatty acids; fermentation; type 2 diabetes



Biography

Muhammad Mazhar, a doctoral student at Guizhou University China, is leading this research project, which is expected to be completed by the next year. The present study focuses on the investigation of Adzuki beans and their endogenous components, including the determination of their glycemic index, phenolic profile, and fermentation by human gut microbiota. Additionally, this research aims to explore the genomics and metabolomics of fermented beans. The findings of this study are expected to provide valuable insights into the nutritional and health benefits of Adzuki beans and their potential as a functional food source. The combined effects of endogenous components of adzuki beans will be evaluated for type 2 diabetes patients.

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