The Effects of Sugar Substitutes and Prebiotics on the Gut Microbiome

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The gut microbiome plays an essential role in human health. Sugar substitutes and food preservatives were tested for their effects on the microbiome, specifically their effect on the growth of bacteria or its susceptibility to antibiotics. The prebiotic inulin was added to determine if it counteracts harmful effects of the food additives. Sublethal concentrations of sugar substitutes and the protective concentration of inulin were determined. A growth curve of E. coli was measured with exposure to sucralose, stevia, ascorbic acid, or sodium nitrate all with or without inulin. Minimum inhibitory concentrations (MICs) and zones of inhibition of antibiotics were determined with exposure to sucralose or preservatives with or without inulin. Exposure to food additives increased the lag times of E. coli, and the prebiotic inulin increased them further. The MICs of ampicillin or chloramphenicol with E. coli decreased with exposure to sugar substitutes or preservatives. With additional exposure to inulin, the MICs of ampicillin all increased whereas the MICs of chloramphenicol showed mixed results. The zones of inhibition of antibiotics with either E. coli or L. acidophilus showed a statistically significant increase with exposure to sucralose but decreased when inulin was added. In conclusion, sugar substitutes and food preservatives inhibited the growth of E. coli and acted synergistically with antibiotics. Overall, the addition of inulin appeared protective and counteracted the effects of the food additives on the susceptibility of bacteria to antibiotics. The microbiome is important for human health, but we may be altering it by consuming these additives.

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