

Tomato polyphenols modulate starch digestion: implications for low-glycaemic meals

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Background & Objectives:

During food digestion, polyphenols and starch may interact altering starch digestion and thus, influencing postprandial blood sugar levels. This study examines the effect of tomato polyphenols on starch digestion, considering that tomato products are often consumed alongside starchy meals. The aim is to determine whether polyphenols from different tomato varieties and processing methods can reduce starch digestibility and to identify the best tomato source of polyphenols to lower starch digestibility.

Methods:

Polyphenols were extracted from the peel of raw tomatoes (two varieties) and a commercial tomato paste. The total phenolic content was quantified using the Folin-Ciocalteu assay, and untargeted metabolomics (UHPLC-ESI-QTOF-MS/MS) was used to determine the phenolic profile. Starch digestibility was tested using a single-enzyme digestion model. Gelatinised starch was incubated with polyphenol extracts in two concentrations: one matching the starch content and one at half that amount. The release of reducing sugars over 60 minutes was measured using a colorimetric DNS assay.

Results:

A higher dose of polyphenols led to greater inhibition of starch digestion, reducing digestibility by 7.1% compared to the control ($p = 0.018$ at 60 minutes). No significant effect differences were observed between tomato varieties or between raw and processed tomato products.

Conclusion:

Tomato polyphenols can effectively reduce starch digestion, though high concentrations are required to achieve a significant impact. These findings suggest that incorporating tomato polyphenols into starchy meals could be a useful dietary strategy to control glycaemia. Since the effect of the tomato paste does not differ from the use of tomato peels, further research is ongoing to assess the bioavailability of tomato-based products like sauces in supporting glycaemic control.

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Summary of the CV of the first author: Marina Corrado graduated in Food Technology and Nutrition in 2010 and completed an MSc in Nutrition and Health in 2013. She joined the University of Cambridge in 2015 as a research assistant and became a Registered Associate Nutritionist. She earned a PhD in Biological Sciences from the University of East Anglia, focusing on the glycaemic impact of starch. After her PhD in 2021, she continued as a postdoc at the Quadram Institute, studying starch-based foods. In 2023, she received a Marie Skłodowska-Curie Fellowship to research bioactive compounds and joined the University of Barcelona.

Keywords: Folin-Ciocalteu assay, tomatoes skins, glycaemia, kinetics.