Synbiotics show some potential as therapeutic agents in reducing postprandial hyperglycemia present in diabetes, which affects more than 9% of the population, poses inevitable economic and health challenges. Earlier studies on the subject focused on conventional probiotics, oligosaccharides and inulin, the use of which is gradually reduced as they have been found to promote the growth of pathogenic microbes and have an ambiguous effect on the body. The latest definition of synbiotics refers to a mixture of live microorganisms and components selectively used by the host microflora, thus providing health benefits. Therefore, phenolic compounds fit in very well in the trend of seeking for new and effective sources of prebiotics. The multidirectional antidiabetic activity of phenolic compounds has been well established, but the problem in using their health properties is limited bioaccessibility and absorbability from food only up to 20%. The solution to increase the absorption and pro-health effectiveness of these compounds may be enzymatic modifications mediated by the intestinal microflora.

Previous studies on the prebiotic properties of phenolic compounds focused mainly on extending the viability of the probiotic microorganisms and selective modulation of microbiota. In view of the above, it is indispensable to know the essential functions of the combination of synbiotics with the products of the biotransformation of phenolic compounds in the digestion process.

The objective of the project is to define the interactions and the role of synbiotic formulas amplified with phenolic compounds in modulating bioaccessibility in the context of postprandial hyperglycemia.

The project involves the development of synbiotic formulas based on extracts of phenolic compounds obtained from plant materials and probiotic strains of the genus *Lactobacillus* and *Bifidobacterium*. Synbiotic formulas will be assessed for the bioavailability and absorbability of the phenolic compounds in the simulated gastrointestinal tract model and a dialysis membrane module to substitute for the intestinal mucosal barrier. The biological potential will be determined on the basis of the phenolic compound profile using UPLC-PDA/FL liquid chromatography coupled with ESI-Q/TOF-MS mass spectrometry and the *in vitro* inhibition of postprandial hyperglycemia.

The planned basic studies will provide thorough knowledge of the new concept of non-oligosaccharide synbiotics. The conducted research is to explain how bi-directional prebiotic-probiotic interactions have affected the anti-hyperglycemic effect of the synbiotic formulas in the context of simulated digestion. The in vitro analyses of bioaccessibility and absorption of the digested food fractions will be essential in the examination of the phenolic metabolites of biotransformation and post-digestive phenolic metabolites, their structures, and the beneficial health effect potential of bioaccessible compounds which are, therefore, realistically effective in lowering postprandial hyperglycemia. In future, the results obtained and the knowledge acquired may help design functional foods and contribute to the development of effective non-pharmacological treatment of postprandial hyperglycemia.