

## ABSTRACT

Pleurotus eryngii polysaccharides have been shown to exert significant biological activities to the host. However, few studies have been conducted on its effects on gastrointestinal tract (GIT) health alteration. In the present study, small intestinal and colonic proteome alterations generated by dietary supplementation with a novel homogeneous *P. eryngii* polysaccharide (PEP) in C57BL/6 mice, based on the isobaric tag for relative and absolute quantification (iTRAQ) proteomics, are investigated. Compared to the control group, PEP supplementation result in a total of 113 and 194 significant differential proteins (DPs) in the small intestine and colon, respectively. Interestingly, DPs in small intestine are mainly related to the transport and biosynthetic process, along with the digestion and absorption pathway of nutrients, whereas the colonic DPs are significantly found participating in numerous metabolic processes. Moreover, the alterations of some DPs in small intestine and colon are speculated to correlate with the colonic microbiota structure and are involved in the regulation of host immune response. Subsequently, some critical DPs of small intestine and colon are selected and validated by Western blotting. The current research facilitated the generation of potential insights into the health benefit activities and functional mechanisms of polysaccharides from *P. eryngii*.

**Keywords:** *Pleurotus eryngii* polysaccharide; gastrointestinal tract; iTRAQ-based proteomics; immune response; nutrients digestion and metabolism.