

Structural diversity and comparative anti-inflammatory properties of indigenous Lactobacillus species and their peptidoglycans

ABS- 012



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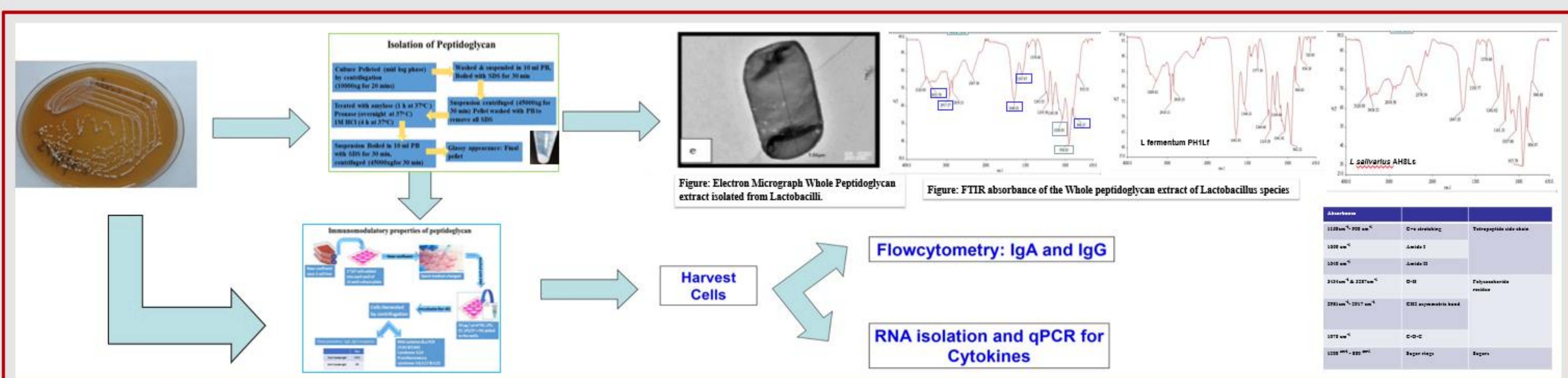
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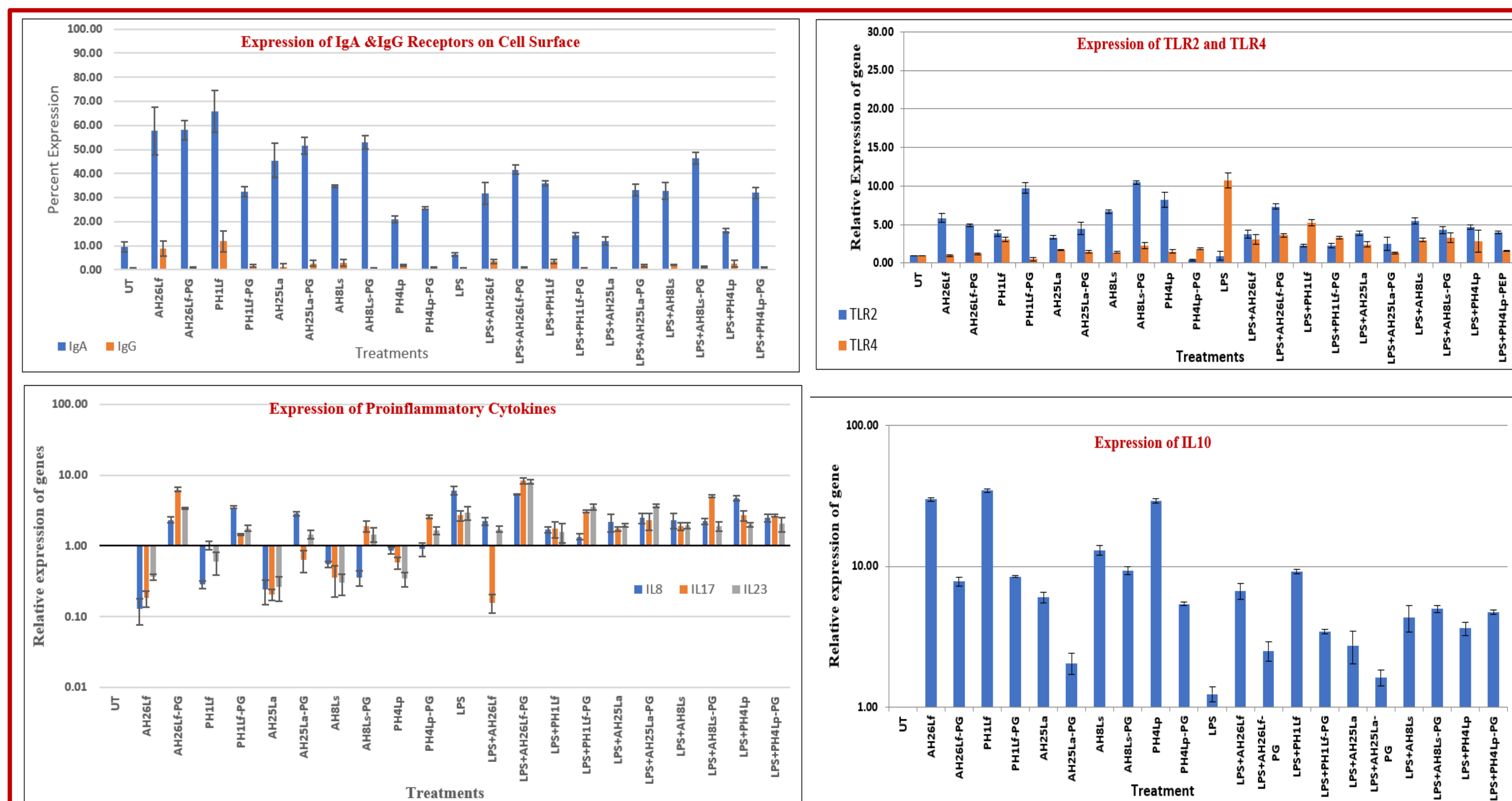
INTRODUCTION

- Lactobacilli are the normal resident of the gastrointestinal tract of humans.
- It plays an important role in maintaining a healthy gut by regulating its microbiome and immune response.
- It elicits the innate immune response following the interaction of microbe-associated molecular patterns (MAMPs) with the pathogen recognition receptors (PRR) of the host.
- Gram-positive bacteria contain a 20–80 nm thick cell wall with peptidoglycan accounting for 40–90% of its dry weight.
- Peptidoglycan is a major MAMP of the bacteria and is recognized by TLR2, NOD1, and NOD2.
- Therefore, it is important to determine whether peptidoglycans isolated from LAB display a potent anti-inflammatory effect on pathogenic bacteria.
- To assess these receptors' immuno-modulatory potential, we have performed isolation, characterization, and evaluation of immuno-modulatory properties of whole peptidoglycan extract (PG) isolated from *Lactobacilli*.

MATERIALS AND METHODS



RESULTS & DISCUSSION



- The FT-IR analysis showed the presence of chemical bonds
 - C=O stretching vibration band,
 - N-H deformation, and
 - a C-N mixture of amide II
- Suggest the existence of tetrapeptide stems substituted in the NAM residues.
- The polysaccharide residues (probably NAG-(-1,4)-NAM) is represented by the presence of
 - An O-H absorption band,
 - N-H absorption band at 3300 cm⁻¹,
 - a CH₂ asymmetric band and
 - a C-O-C band.
- The strong absorption peak at 3300 cm⁻¹ may also represent peptide stems substituted in the NAM residues.

- Only TLR-2 acts as a ligand for peptidoglycan as
 - The whole peptidoglycan extract of *L fermentum*, *L acidophilus*, *L salivarius* significantly upregulated the expression of TLR 2 (p< 0.001) in Caco-2 cells.
 - They significantly downregulated the expression of TLR4 (p<0.001).
- The whole peptidoglycan extract of *L fermentum*, *L acidophilus*, *L salivarius* and *L plantarum* altered the expression of proinflammatory cytokines
 - They significantly downregulated the expression of IL8 in Caco-2 cells.
 - The whole peptidoglycan extract of only *L salivarius* and *L plantarum* downregulated the expression of IL17 and IL23 significantly (p< 0.01).
 - The whole peptidoglycan extract of *L fermentum*, *L salivarius* and *L plantarum* significantly upregulated the expression of anti-inflammatory cytokine IL10.
- Taken together, the whole peptidoglycan extract of *L fermentum*, *L salivarius* and *L plantarum* only exhibited anti-inflammatory properties invitro.

KEY POINTS & CONCLUSION

This data provides new insight into the cellular and molecular mechanism by which probiotic bacteria can contribute to maintaining good health. Exploring the diversity of peptidoglycan will help better understand their potential use in various pharmaceutical applications.

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