CHAPTER 7

Summary

The present study reported the supporting data about the manipulation of metabolic syndrome using probiotic bacteria through mechanisms by which attenuation of metabolic endotoxemia along with gut inflammation in animal study. Rat model showed significant increased metabolic parameters including rat body weight, visceral fat mass, glucose tolerance, plasma cholesterol, plasma triglyceride, plasma LDL/VLDL and insulin resistance in long-term high-fat diet fed group when compared to the normal diet-fed group. In addition, high-fat diet consumption enhanced metabolic endotoxemia and gut inflammation compared with normal diet feeding in rats. There was also significant increase in viable Enterobacteriaceae numbers (phylum Proteobacteria) in the high-fat diet-induced obese-insulin resistant rats whereas no significant changes in *Lactobacillus* (phylum Firmicutes) and *Bifidobacterium* (phylum Actinobacteria) numbers were observed when compared to the lean counterparts. Treatment with the novel non-human isolated probiotic *Lactobacillus paracasei* ST11 (HP4) for 12 weeks resulted in significant improved plasma cholesterol levels and insulin resistance in obese-insulin resistant rat model. Moreover, *L. paracasei* ST11 (HP4) treatment not only significantly reduced metabolic endotoxemia as shown by dramatic decreased serum lipopolysaccharide levels, it also markedly attenuated pro-inflammatory cytokine gene expression levels of IL-1β and IL-6 in rat ileums. Although, there was no significant alteration of gut microbiota representative including *Lactobacillus*, *Bifidobacterium* and Enterobacteriaceae observed by conventional culture method at the end of probiotic intervention, treatment with this probiotic *Lactobacillus* strain showed the positive promising results in obese-insulin resistant rat model. Additionally, the probiotic *L. paracasei* ST11 (HP4) needs to be further investigated its beneficial roles in patients with obesity and insulin resistance in the level of clinical study.