

List of figures

| Figure No. | Title | Page No |
|--|---|---------|
| Chapter 1 Introduction | | |
| 1.1 | Epidemiology of Diabetes Mellitus | 7 |
| 1.2 | Mechanisms implicated in the insulin resistance | 11 |
| 1.3 | Roles of adipokines in insulin signalling | 12 |
| 1.4 | A simplified model of insulin resistance | 14 |
| 1.5 | Resistin as a potential regulator of inflammation | 16 |
| 1.6 | The protective function of omentin-1 | 18 |
| 1.7 | Anti-inflammatory and anti-apoptotic effects of vaspin | 20 |
| 1.8 | Cellular pathways to β -cell regeneration | 22 |
| 1.9 | Molecular mechanisms of lipo- and glucolipotoxic β -cell apoptosis | 23 |
| 1.10 | The functions of GABA in pancreatic cells, in health and in T2D | 29 |
| Chapter 2 To study the role of Resistin in Type 2 Diabetes | | |
| 2.1 | Representative gel images of <i>resistin</i> promoter SNPs | 46 |
| 2.2 | Linkage Disequilibrium (LD) block | 48 |
| 2.3 | Plasma resistin protein levels in A) controls vs patients B) Association of <i>resistin</i> polymorphisms with plasma resistin protein levels | 49 |
| 2.4 | Role of resistin in T2D | 52 |
| Chapter 3 To study the role of Omentin-1 in Type 2 Diabetes | | |
| 3.1 | Representative gel images of <i>omentin-1</i> SNPs | 64 |
| 3.2 | Linkage disequilibrium (LD) block | 66 |
| 3.3 | A) Relative fold change of <i>omentin-1</i> transcript levels in adipose tissue of controls and patients B) Association of <i>omentin-1</i> polymorphisms with their transcript levels | 67 |
| 3.4 | Plasma omentin-1 protein levels in A) controls vs patients. B) Association of <i>omentin-1</i> polymorphisms with plasma omentin-1 protein levels. | 68 |
| 3.5 | Role of Omentin-1 in T2D | 71 |
| Chapter 4 To study the role of Vaspin in Type 2 Diabetes | | |
| 4.1 | Representative gel image of <i>vaspin</i> SNPs | 81 |
| 4.2 | Linkage disequilibrium (LD) block | 82 |
| 4.3 | A) Relative fold change of vaspin transcript levels in adipose tissue of controls and patients. B) Association of <i>vaspin</i> polymorphisms with their transcript levels | 83 |
| 4.4 | Plasma vaspin levels in A) controls vs patients. C) Association of <i>vaspin</i> polymorphisms with plasma vaspin protein levels. | 84 |
| 4.5 | The role of vaspin in obesity-induced T2D | 87 |
| Chapter 5 To investigate the effect of GABA, CR and combination treatment on pancreatic β-cell proliferation in HFD + STZ induced experimental mouse model | | |
| 5.1 | The experimental timeline | 95 |

| | | |
|--------------------|--|-----|
| 5.2 | (A-D) Body weight and fasting blood glucose levels in experimental diabetic mice | 99 |
| 5.3 | Body weight and fasting blood glucose levels | 100 |
| 5.4 | Plasma lipid levels | 101 |
| 5.5 | IGTT and IPIST | 101 |
| 5.6 | Plasma insulin, c-peptide levels and insulin/c-peptide ratio | 102 |
| 5.7 | Transcript levels of glucoregulatory enzymes in the liver: A. <i>GCK</i> fold change B & C. Fold change in <i>PEPCK</i> & <i>G6Pase</i> D-E. <i>Glycogen synthase</i> , <i>GLUT2</i> fold change F. Fold change in <i>Glycogen phosphorylase</i> | 103 |
| 5.8 | Transcript levels of lipid metabolism markers in the adipose tissue. A) Fold change in <i>ATGL</i> B) Fold change in <i>ACC-1</i> | 104 |
| 5.9 | Transcript levels of mitochondrial biogenesis markers in the skeletal muscle. A) Fold change in <i>SIRT-1</i> mRNA. B) <i>PGC-1α</i> mRNA fold change. C) <i>TFAM</i> mRNA fold change. | 104 |
| 5.10 | Estimation of OCR in the skeletal muscle | 105 |
| 5.11 | Assessment of pancreatic β -cell proliferation, neogenesis, transdifferentiation and apoptosis | 106 |
| 5.12 | The effect of GABA, CR and CR+GABA (combination therapy) on amelioration of T2D pathophysiology in HFD+STZ induced T2D mouse model | 110 |
| Conclusions | | |
| 7.1 | The role of resistin, omentin-1 and vaspin in development of T2D. | 117 |
| 7.2 | The effect of GABA, CR and CR+GABA (combination therapy) on amelioration of T2D pathophysiology in HFD+STZ induced T2D mouse model | 118 |