# REPORT

Effect of DB 1 (Phase-3) on Streptozotocin-Nicotinamide induced diabetes mellitus in rats

## SPONSOR

Herbal Luxe Pvt. Ltd.
PUNE

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## STUDY DIRECTOR

Dr. ARULMOZHI.S

**REPORT SUBMISSION DATE: 21/01/25**

**STUDY CODE:** HL 1- 2025-2026

## Report on

# NON-CLINICAL PHARMACOLOGY

Effect of DB 1 (Phase-3) on Streptozotocin-Nicotinamide induced diabetes mellitus in rats

**PROJECT START DATE: 02/05/25**

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|---|---|
| **TITLE OF THE PROJECT** | Effect of DB 1 (Phase-3) on Streptozotocin-Nicotinamide induced diabetes mellitus in rats |
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# STATEMENT OF COMPLIANCE

**Study Code: HL 1-2025-2026**

**Study Title:** Effect of DB 1 (Phase-3) on Streptozotocin-Nicotinamide induced diabetes mellitus in rats

We hereby attest to the authenticity of the study and guarantee that the data is correct and accurate to the best of our knowledge and that the study was performed by the procedure described in the Standard Operating Procedures of Department of Pharmacology, Bharati Vidyapeeth (Deemed to be University), Poona College of Pharmacy, Pune.

The study complies with the protocol mutually agreed.

| STUDY DIRECTOR | Signature | Date |
|---|---|---|
| Dr. Arulmozhi. S | | |

# CONFIDENTIALITY

We hereby confirm that the research protocol was followed as per standard GLP protocols.

The study was conducted using recommended/approved methods.

The report is confidential in nature and access is restricted to authorized people only.

| STUDY DIRECTOR | Signature | Date |
|---|---|---|
| Dr. Arulmozhi. S | | |

# CERTIFICATE ON COMPLETION OF PROJECT

| | |
|---|---|
| **Project Title** | Effect of DB 1 (Phase-3) on Streptozotocin-Nicotinamide induced diabetes mellitus in rats. |
| **Sponsored by** | Herbal Luxe Pvt. Ltd. |
| **Research conducted at** | Department of Pharmacology, Bharati Vidyapeeth (Deemed to be University) Poona College of Pharmacy, Pune. |
| **Project completed by** | Dr. Arulmozhi. S, Assistant Professor,<br>Department of Pharmacology, Bharati Vidyapeeth (Deemed to be University) Poona College of Pharmacy, Pune. |

We hereby confirm that research project is successfully completed, and report has been submitted to Herbal Luxe, Pune, India

| **STUDY DIRECTOR** | **Signature** | **Date** |
|---|---|---|
| Dr. Arulmozhi. S | | |

## CERTIFICATE OF PERSONNEL INVOLVED

This is to certify that the work presented in this report entitled "Effect of DB 1 (Phase-3) on Streptozotocin-Nicotinamide induced diabetes mellitus in rats" is carried in the laboratories of Bharati Vidyapeeth (Deemed to be University) Poona College of Pharmacy, Pune. The relevant documentation as per GLP is maintained in the institute.

| **Personnel involved** | **Signatures** |
|---|---|
| **Report prepared by:** | Ms. Aditi Patwardhan |
| **Report Quality control done by:** | Ms. Ashima Sharma |
| **Report approved by** | Dr. Arulmozhi. S |

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**Effect of DB 1 (Phase-3) on Streptozotocin-Nicotinamide induced diabetes mellitus in rats**

Aim: The aim of the present study is to evaluate the expression of genes on treatment with DB 1 in Streptozotocin-Nicotinamide induced diabetes mellitus in rats.

Objectives:

1. To induce diabetes mellitus by intraperitoneal administration of Streptozotocin-Nicotinamide.
2. To determine the effect of treatment of wellia 1 on blood glucose, lipid profile, hepatic profile, kidney profile and bone strength.
3. To compare the effect of wellia 1 with standard metformin.

**Materials and Methods:**

**1. Gene Expression Assay**

**Instrument used:** ABi Quantstudio 5 (Applied Biosystems, USA)

**Chemicals, Reagent and Samples Used:** GET$^{TM}$ Total RNA extraction kit (GBiosciences, USA; Cat No. 786-132).

**Primer Sequence Used:**

| Gene Name | Forward primer | Reverse Primer |
|---|---|---|
| TNF-α | ACTGAACTTCGGGGTGATTG | GCTTGGTGGTTTGCTACGAC |
| IL-1 | CACCTTCTTTTCCTTCATCTTTG | GTCGTTGCTTGTCTCTCCTTGTA |
| IL-6 | TGATGGATCCTTCCAAACTG | GAGCATTGGAAGTTGGGGTA |
| NFκB | AATTGCCCCGGCAT | TCCCGTAACCGCGTA |
| Glutathione | GGGCAAAGAAGATTCCAGGTT | AGAGCGGGTGAGCCTTCT |
| Adiponectin | CTACTGTTGCAAGCTCTCC | CTTCACATCTTTCATGTACACC |
| KRAS | AGAGTGCCTTGACGATACAGC | CTGCTGTGTCGAGAATATCCTC |
| GAPDH | ATGCCCCCATGTTTGTGATG | TCCACGATGCCAAAGTTGTC |

**Sample Codes as follows:**

| Group | Tissue | Sample Code | |
|---|---|---|---|
| Normal Control | Liver | NCL1 | NCL2 |
| | Kidney | NCK1 | NCK2 |
| | Pancreas | NCP1 | NCP2 |
| Diabetic Control | Liver | DCL1 | DCL2 |
| | Kidney | DCK1 | DCK2 |
| | Pancreas | DCP1 | DCP2 |
| DB1 | Liver | DBL1 | DBL2 |
| | Kidney | DBK1 | DBK2 |
| | Pancreas | DBP1 | DBP2 |

## Methodology:

### 1. RNA extraction:

- Total RNA was isolated from the samples – (as mentioned above) submitted with GET$^{TM}$ Total RNA extraction kit (GBiosciences, USA; Cat No. 786-132).
- Add 1ml lysis buffer for tissue samples Homogenized using a Dounce hand homogenizer.
- Homogenized samples were incubated at room temperature for 5 min, to permit complete dissociation of the nucleoprotein complex.
- 200 µl of chloroform per 1 ml lysis buffer was added for homogenization. The cap the tube was secured and vortexed for 15 s and it was incubated for 3-5 minutes at room temperature.
- The samples were centrifuged for 10 min at 12,000 rpm at 2-8°C. RNA remains exclusively in the aqueous phase. The aqueous phase was pipetted out into a new tube.
- Preparation of RNase free Collection Column: 500µL Balance Buffer was added in Collection Column tube, incubate for 2 minutes at room temperature. This was centrifuged for 2 min at 12,000 rpm at 4°C. The flow through was discarded.
- 200µL ethanol was added in the aqueous phase from step 4 and vortexed, and the aqueous phase was transferred in Collection Column.
- 600µL of washing Buffer was added in Collection Column Tube, centrifuged for 2min at 12,000 rpm at 4°C. The flow through was discarded.
- 500µL Washing Buffer was added in Collection Column Tube, centrifuged for 2 min at 12,000 rpm at 4°C. The flow through was discarded.

- This was centrifuged for 2 min at 12,000 rpm, incubated for a few minutesto dry the spin column membrane, to ensure that no ethanol is carried over during RNA elution. The collection tube was discarded.
- The RNase-Free Spin Column was placed in a new 1.5 ml collection tube. 60 µl RNase- free water was added directly to the spin column membrane. It was incubated for 5 min at room temperature and centrifuged for 2 min at 12,000 rpm to elute the RNA.

**2. Quantification of RNA and cDNA synthesis:**

RNA concentration (quantification) was checked using the Take3 plate in Epoch instrument (BioTek, USA). Concentration of RNA should be more than 1000 ng for preparation of cDNA from it. 2000ng total RNA was used for to make cDNA. The ratio of absorbance i.e. 260/280 should be 1.9 to 2 for RNA samples. After determining RNA purity and concentration and verifying RNA integrity, the messenger RNA (mRNA) was reverse transcribed into complementary DNA (cDNA) using High-Capacity cDNA Reverse Transcription Kit (Applied Biosystems; Cat no. 4368814).

**3. RNA concentration**

| Name of sample | ng/µL | 260/280 |
|---|---|---|
| NCL1 | 979.1 | 1.99 |
| NCL2 | 478.8 | 1.97 |
| DCL1 | 925.8 | 1.97 |
| DCL2 | 1233.4 | 1.97 |
| DBL1 | 1461.6 | 1.99 |
| DBL2 | 1068.1 | 1.98 |
| NCK1 | 1207.9 | 1.95 |
| NCK2 | 2267.6 | 1.92 |
| DCK1 | 1218.0 | 1.98 |

| Name of sample | ng/µL | 260/280 |
|---|---|---|
| DCK2 | 1613.1 | 1.97 |
| DBK1 | 1779.3 | 1.97 |
| DBK2 | 1311.8 | 1.96 |
| NCP1 | 1049.1 | 1.97 |
| NCP2 | 981.2 | 1.96 |
| DCP1 | 1077.2 | 2.01 |
| DCP2 | 1080.1 | 2.06 |
| DBP1 | 766.6 | 2.00 |
| DBP2 | 1719.2 | 1.96 |

**4. Real-Time PCR and analysis**

The expression analysis was performed by SYBR green chemistry detection with Quantstudio 5 Realtime PCR System (Applied Biosystems) and data were collected with ABI's Quantstudio 5 SDS Software. The experiments were conducted with PowerUp SYBR green PCR Master Mix (Applied Biosystems, USA), with the specific primer using the following PCR conditions: an activation stage at 95°C for 5 min and 40 cycles at: 95°C for 15 sec, 60°C for 30 sec followed by melt curve conditions; 95°C for 15 sec, 60°C for 1 min up to 95°C per second. GAPDH gene was amplified in separate tubes as an active endogenous reference to normalize quantification of a mRNA target. Fluorescence signal baseline and threshold were set manually for each detector generating a cycle threshold (Ct) for each sample. One sample of each group along with endogenous control were amplified with a no template control (NTC).

The relative expression levels of the target genes were analyzed by taking the base 2 logarithm transformed $2-\Delta Ct$ values as parameter. Results are represented as fold change values calculated using the $2-\Delta\Delta Ct$ method (Livak and Schmittgen, 2001). Sample control is taken as control group and compared to all other groups for obtaining fold change ie. RQ (relative quantitation) value.

**5. Determination of Malondialdehyde (MDA) from liver, pancreas and kidney**:

Malondialdehyde (MDA) (nmol/mg protein), a measure of lipid peroxidation, was assayed in the form of thiobarbituric acid-reacting substances (TBARS) by the method of Ohkawa et al. Briefly, to 0.2 ml of 8.1% sodium dodecyl sulphate, 1.5 ml of 20% acetic acid (pH 3.5) and 1.5 ml of 0.81% thiobarbituric acid aqueous solution were added in succession. To this reaction mixture, 0.2 ml of the pancreatic tissue sample was added. The mixture was then heated in boiling water for 60 min. After cooling to room temperature, 5 ml of butanol: pyridine (15: 1 v/v) solutions were added. The mixture was then centrifuged at 2,000 g for 15 min. The upper organic layer was separated, and the intensity of the resulting pink color was

read at 532 nm. Tetramethoxypropane was used as an external standard. The level of lipid peroxides was expressed as nanomole of MDA formed/mg protein.

**Results:**

**Effect of DB1 on TNF α expression in Liver, Kidney and Pancreas of nicotinamide-streptozotocin induced diabetic rats**

There was a significant increase in the TNF α expressions in the liver, kidney and pancreas of the diabetic control group, when compared to the normal control group. There was a 9-fold increase ($p<0.001$) in the liver TNF α expression in diabetic control group, which significantly ($p<0.001$) decreased to 3.35-fold upon treatment with DB1 (Table 1, Figure 1a). There was a 5-fold increase($p<0.01$) in the pancreatic TNF α expression in diabetic control group, which decreased to 2-fold ($p<0.01$) upon treatment with DB1 (Table 1, Figure 1b). There was a 4-fold increase ($p<0.001$) in the kidney TNF α expression in diabetic control group, which decreased to 1.46-fold ($p<0.001$) upon treatment with DB1 (Table 1, Figure 1c).

**Effect of DB1 on IL 1 expression in Liver, Kidney and Pancreas of nicotinamide-streptozotocin induced diabetic rats**

There was a significant increase in the IL 1 expression in the liver, kidney and pancreas of the diabetic control group, when compared to the normal control group. There was a 10-fold increase ($p<0.01$) in the liver IL 1 expression in diabetic control group, which significantly ($p<0.01$) decreased to 2.26-fold upon treatment with DB1 (Table 1, Figure 2a). There was a 4-fold increase($p<0.01$) in the pancreatic IL 1 expression in diabetic control group, which decreased to 1.64-fold ($p<0.01$) upon treatment with DB1 (Table 1, Figure 2b). There was a 2.77-fold increase ($p<0.05$) in the kidney IL 1 expression in diabetic control group, which decreased to 1.5-fold ($p<0.05$) upon treatment with DB1 (Table 1, Figure 2c).

**Effect of DB1 on IL 6 expression in Liver, Kidney and Pancreas of nicotinamide-streptozotocin induced diabetic rats**

There was a significant increase in the IL 6 expression in the liver, kidney and pancreas of the diabetic control group, when compared to the normal control group. There was a 7.8-fold increase ($p<0.01$) in the liver IL 6 expression in diabetic control group, which significantly ($p<0.01$) decreased to 1.52-fold upon treatment with DB1 (Table 1, Figure 3a). There was a 3.37-fold increase($p<0.01$) in the pancreatic IL 6 expression in diabetic control group, which decreased to 1.46-fold ($p<0.01$) upon treatment with DB1 (Table 1, Figure 3b). There was a 2.86-fold increase ($p<0.05$) in the kidney IL 6 expression in diabetic control group, which decreased to 1.4-fold ($p<0.05$) upon treatment with DB1 (Table 1, Figure 3c).

**Effect of DB1 on NFκB expression in Liver, Kidney and Pancreas of nicotinamide-streptozotocin induced diabetic rats**

There was a significant increase in the NFκB expression in the liver, kidney and pancreas of the diabetic control group, when compared to the normal control group. There was a 3.84-fold increase ($p<0.01$) in the liver NFκB expression in diabetic control group, which significantly ($p<0.01$) decreased to 1.78-fold upon treatment with DB1 (Table 1, Figure 4a). There was a 4.25-fold increase($p<0.001$) in the pancreatic NFκB expression in diabetic control group, which decreased to 1.73-fold ($p<0.001$) upon treatment with DB1 (Table 1, Figure 4b). There was a 2.01-fold increase ($p<0.001$) in the kidney NFκB expression in diabetic control group, which decreased to 1.22-fold ($p<0.001$) upon treatment with DB1 (Table 1, Figure 4c).

**Effect of DB1 on Glutathione expression in Liver, Kidney and Pancreas of nicotinamide-streptozotocin induced diabetic rats**

There was a significant decrease in the glutathione expression in the liver, kidney and pancreas of the diabetic control group, when compared to the normal control group. There was a decrease to 0.30-fold ($p<0.01$) in the liver glutathione expression in diabetic control group, which was significantly ($p<0.01$) improved to 0.71-fold upon treatment with DB1 (Table 1, Figure 5a). There was a 0.36-fold decrease ($p<0.05$) in the pancreatic glutathione expression in diabetic control group, which improved to 0.60-fold ($p<0.05$) upon treatment with DB1 (Table 1, Figure 5b). There was a 0.30-fold decrease ($p<0.01$) in the kidney glutathione expression in diabetic control group, which improved to 0.72-fold ($p<0.01$) upon treatment with DB1 (Table 1, Figure 5c).

**Effect of DB1 on Adiponectin expression in Liver, Kidney and Pancreas of nicotinamide-streptozotocin induced diabetic rats**

There was a significant decrease in the adiponectin expression in the liver, kidney and pancreas of the diabetic control group, when compared to the normal control group. There was a decrease to 0.31-fold ($p<0.01$) in the liver glutathione expression in diabetic control group, which was significantly ($p<0.01$) improved to 0.65-fold upon treatment with DB1 (Table 1, Figure 6a). There was a 0.46-fold decrease ($p<0.01$) in the pancreatic adiponectin expression in diabetic control group, which improved to 0.77-fold ($p<0.01$) upon treatment with DB1 (Table 1, Figure 6b). There was a 0.29-fold decrease ($p<0.05$) in the kidney adiponectin expression in diabetic control group, which improved to 0.75-fold ($p<0.05$) upon treatment with DB1 (Table 1, Figure 6c).

**Effect of DB1 on KRAS expression in Liver, Kidney and Pancreas of nicotinamide-streptozotocin induced diabetic rats**

There was an increase in the adiponectin expression in the liver, kidney and pancreas of the diabetic control group, when compared to the normal control group. There was an increase of 1.53-fold in the liver KRAS expression in diabetic control group, which improved to 1.44-fold upon treatment with DB1 (Table 1, Figure 7a). However, this change was not significant. There was a 4.52-fold increase ($p<0.01$) in the pancreatic KRAS expression in diabetic control group, which improved to 2.54-fold ($p<0.01$) upon treatment with DB1 (Table 1, Figure 7b). There was a 1.48-fold increase in the kidney adiponectin expression in diabetic control group, which improved to 1.25-fold upon treatment with DB1 (Table 1, Figure 7c). However, this change was not significant.

**Effect of DB1 on MDA levels (nmol/mg of Protein) in Liver, Kidney and Pancreas of nicotinamide-streptozotocin induced diabetic rats**

There was an increase in the levels of MDA in the liver, kidney and pancreas of the diabetic control group, when compared to the normal control group. There was a significant ($p<0.01$) increase of liver MDA in diabetic control group, which significantly decreased ($p<0.01$) upon treatment with DB1 (Table 1, Figure 8a). There was a significant ($p<0.05$) increase of pancreatic MDA in diabetic control group, which significantly decreased ($p<0.05$) upon treatment with DB1 (Table 1, Figure 8b). There was a significant ($p<0.05$) increase of pancreatic MDA in diabetic control group, which significantly decreased ($p<0.05$) upon treatment with DB1 (Table 1, Figure 8c).

**Table 1: Effect of DB1 on Gene expression and MDA levels in Liver, Kidney and Pancreas of nicotinamide-streptozotocin induced diabetic rats**

| Parameter | Organ | Normal Control | Diabetic Control | DB 1 Treated |
|---|---|---|---|---|
| Expression of TNF α | Liver | 1.00 ± 0.00 | 8.95 ± 0.41$^{###}$ | 3.35 ± 0.03$^{***}$ |
| | Pancreas | 1.00 ± 0.00 | 5.070 ± 0.21$^{##}$ | 2.09 ± 0.26$^{**}$ |
| | Kidney | 1.00 ± 0.00 | 4.07 ± 0.21$^{###}$ | 1.46 ± 0.08$^{***}$ |
| Expression of IL-1 | Liver | 1.00 ± 0.00 | 10.27 ± 0.88$^{##}$ | 2.62 ± 0.32$^{**}$ |
| | Pancreas | 1.00 ± 0.00 | 4.43 ± 0.29$^{##}$ | 1.64 ± 0.26$^{**}$ |
| | Kidney | 1.00 ± 0.00 | 2.77 ± 0.49$^{#}$ | 1.5 ± 0.24$^{*}$ |
| Expression of IL-6 | Liver | 1.00 ± 0.00 | 7.81 ± 0.57$^{##}$ | 1.52 ± 0.24$^{**}$ |
| | Pancreas | 1.00 ± 0.00 | 3.37 ± 0.19$^{##}$ | 1.46 ± 0.08$^{**}$ |
| | Kidney | 1.00 ± 0.00 | 2.86 ± 0.44$^{#}$ | 1.40 ± 0.18$^{*}$ |
| Expression of NF-kB | Liver | 1.00 ± 0.00 | 3.84 ± 0.38$^{##}$ | 1.78 ± 0.06$^{**}$ |
| | Pancreas | 1.00 ± 0.00 | 4.25 ± 0.13$^{###}$ | 1.73 ± 0.11$^{***}$ |
| | Kidney | 1.00 ± 0.00 | 4.01 ± 0.17$^{###}$ | 1.22 ±0.06$^{***}$ |
| Expression of Glutathione | Liver | 1.00 ± 0.00 | 0.30 ± 0.04$^{##}$ | 0.71 ± 0.07$^{**}$ |
| | Pancreas | 1.00 ± 0.00 | 0.36 ± 0.12$^{#}$ | 0.60 ± 0.04$^{*}$ |
| | Kidney | 1.00 ± 0.00 | 0.30 ± 0.06$^{##}$ | 0.72 ± 0.03$^{**}$ |
| Expression of Adiponectin | Liver | 1.00 ± 0.00 | 0.31 ± 0.04$^{##}$ | 0.65 ± 0.09$^{**}$ |
| | Pancreas | 1.00 ± 0.00 | 0.46 ± 0.02$^{##}$ | 0.77 ± 0.03$^{**}$ |
| | Kidney | 1.00 ± 0.00 | 0.29 ± 0.07$^{#}$ | 0.75 ± 0.12$^{*}$ |
| Expression of KRAS | Liver | 1.00 ± 0.00 | 1.53 ± 0.19 | 1.44 ± 0.08 |
| | Pancreas | 1.00 ± 0.00 | 4.52 ± 0.26$^{##}$ | 2.54 ± 0.20$^{**}$ |
| | Kidney | 1.00 ± 0.00 | 1.48 ± 0.24 | 1.25 ± 0.07 |
| MDA (nmol/ mg of protein) | Liver | 50.00 ± 6.00 | 131.00 ± 7.00$^{##}$ | 80.00 ± 4.00$^{**}$ |
| | Pancreas | 0.68 ± 0.14 | 1.29 ± 0.07$^{#}$ | 0.79 ± 0.05$^{*}$ |
| | Kidney | 178.50 ± 2.50 | 351.00 ± 33.00$^{#}$ | 222.00 ± 6.00$^{*}$ |

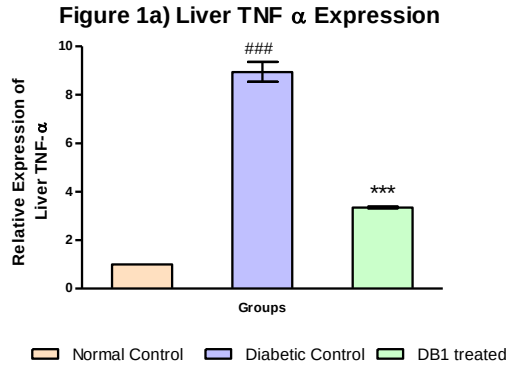
Values are expressed as mean ± SEM, n = 2

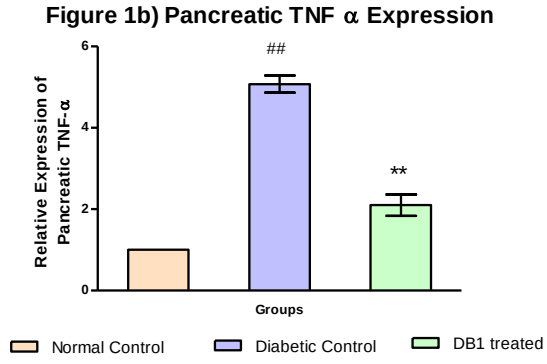
One way ANOVA followed by Dunnet's 't' test

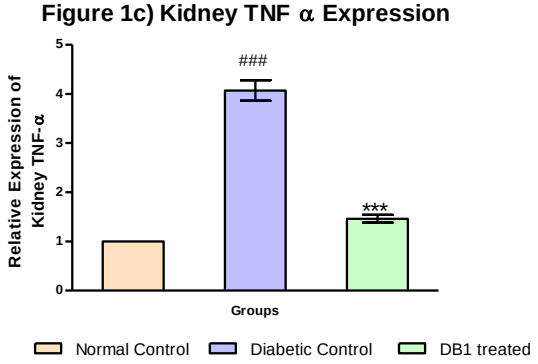
$^{#}p<0.05$, $^{##}p<0.01$, $^{###}p<0.001$ when compared to normal control

*p<0.05, **p<0.01, ***p<0.001 when compared to diabetic control

**Figure 1 Effect of DB1 on TNF α expression in Liver, Pancreatic and Kidney of nicotinamide-streptozotocin induced diabetic rats**



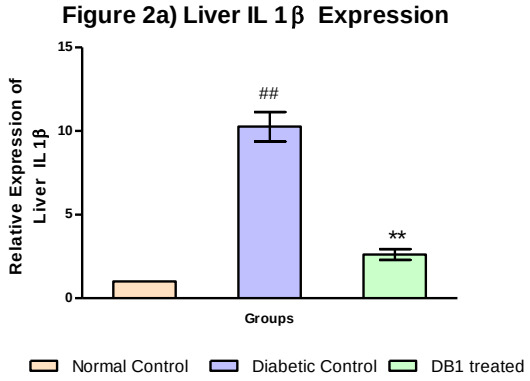



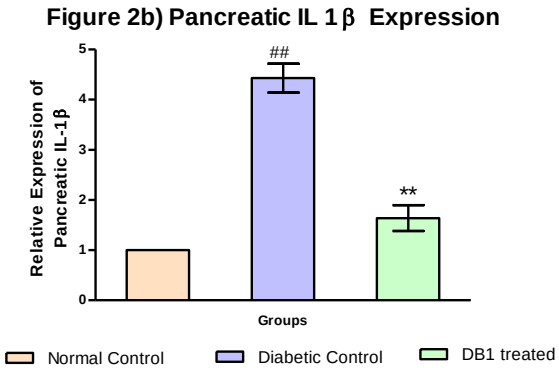



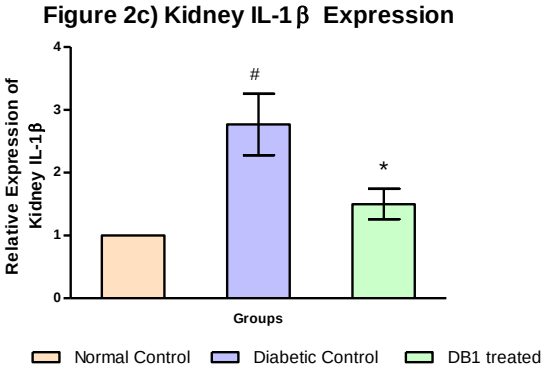

Values are expressed as mean ± SEM, n = 2; One way ANOVA followed by Dunnet's 't' test

$^{##}p<0.01$, $^{###}p<0.001$ when compared to normal control; $^{**}p<0.01$, $^{***}p<0.001$ when compared to diabetic control

**Figure 2 Effect of DB1 on IL 1 expression in Liver, Pancreatic and Kidney of nicotinamide-streptozotocin induced diabetic rats**



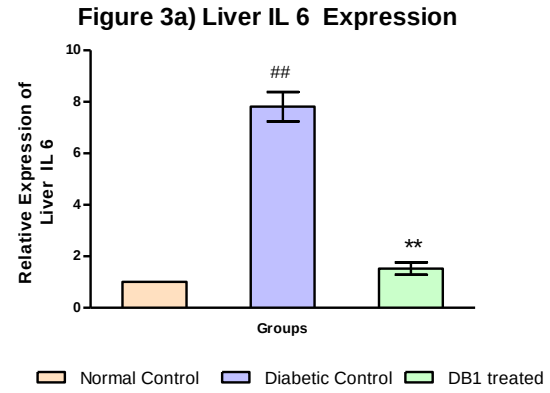



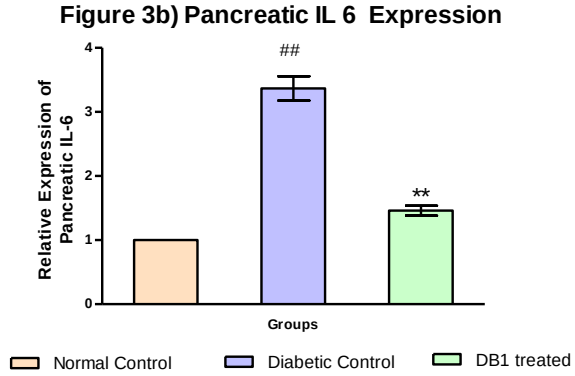



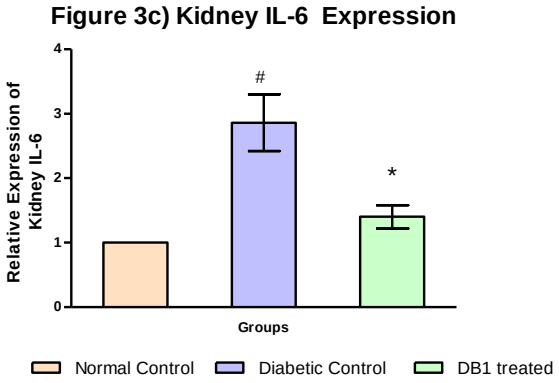

Values are expressed as mean ± SEM, n = 2; One way ANOVA followed by Dunnet's 't' test

$^{\#}p<0.05$, $^{\#\#}p<0.01$ when compared to normal control; *p<0.05, **p<0.01 when compared to diabetic control

**Figure 3 Effect of DB1 on IL 6 expression in Liver, Pancreatic and Kidney of nicotinamide-streptozotocin induced diabetic rats**



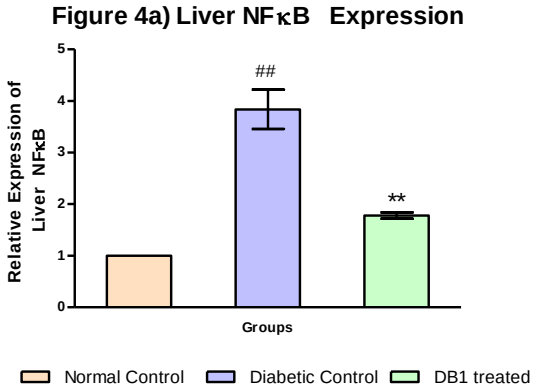



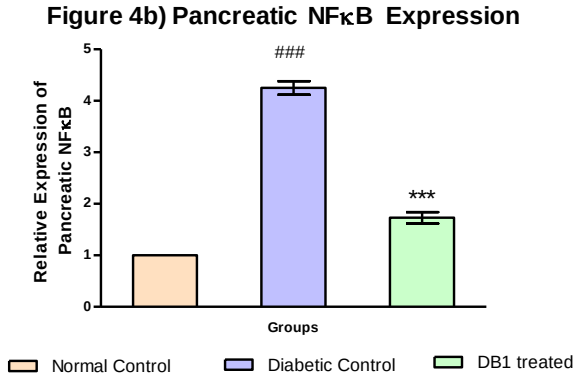



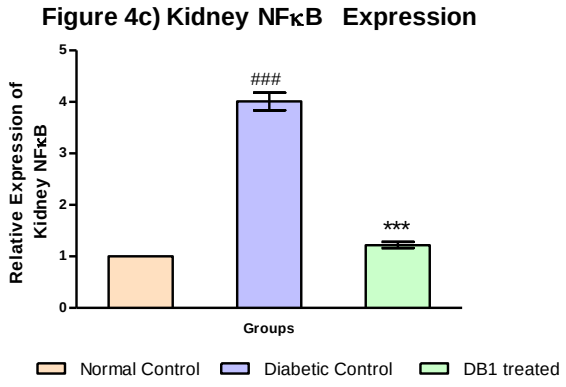

Values are expressed as mean ± SEM, n = 2; One way ANOVA followed by Dunnet's 't' test

$^{\#}p<0.05$, $^{\#\#}p<0.01$ when compared to normal control; *p<0.05, **p<0.01 when compared to diabetic control

**Figure 4 Effect of DB1 on NFκB expression in Liver, Pancreatic and Kidney of nicotinamide-streptozotocin induced diabetic rats**




Values are expressed as mean ± SEM, n = 2; One way ANOVA followed by Dunnet's 't' test

$^{##}p<0.01$, $^{###}p<0.001$ when compared to normal control; $^{**}p<0.01$, $^{***}p<0.001$ when compared to diabetic control

**Figure 5 Effect of DB1 on Glutathione expression in Liver, Pancreatic and Kidney of nicotinamide-streptozotocin induced diabetic rats**

**Figure 5a) Liver Glutathione Expression**

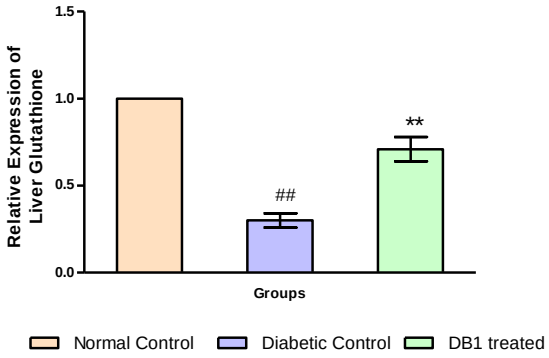



**Figure 5b) Pancreatic Glutathione Expression**

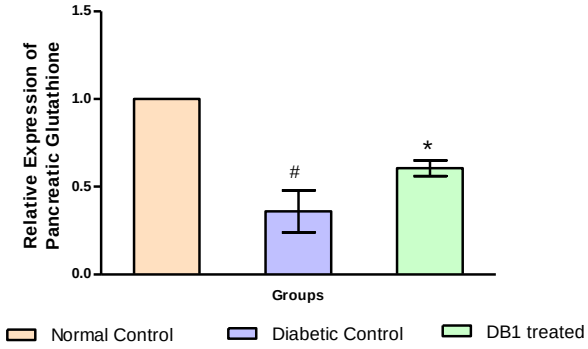
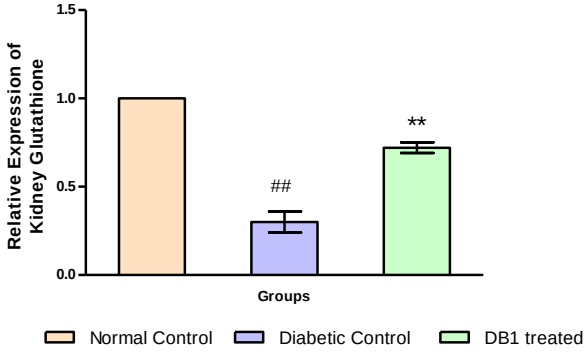



**Figure 5c) Kidney Glutathione Expression**




Values are expressed as mean ± SEM, n = 2; One way ANOVA followed by Dunnet's 't' test

$^{\#}p<0.05$, $^{\#\#}p<0.01$ when compared to normal control; *p<0.05, **p<0.01 when compared to diabetic control

**Figure 6 Effect of DB1 on Adiponectin expression in Liver, Pancreatic and Kidney of nicotinamide-streptozotocin induced diabetic rats**

**Figure 6a) Liver Adiponectin Expression**

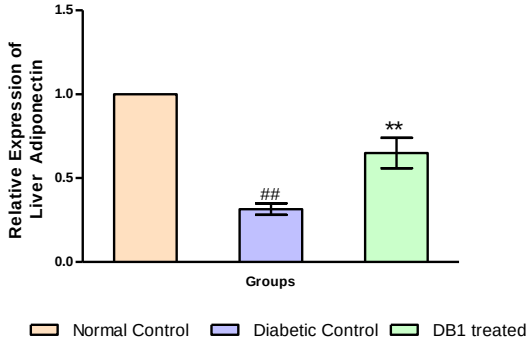



**Figure 6b) Pancreatic Adiponectin Expression**

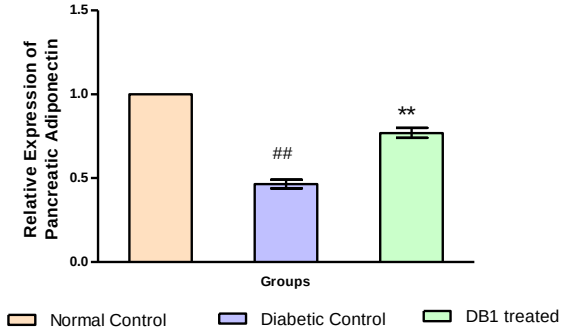
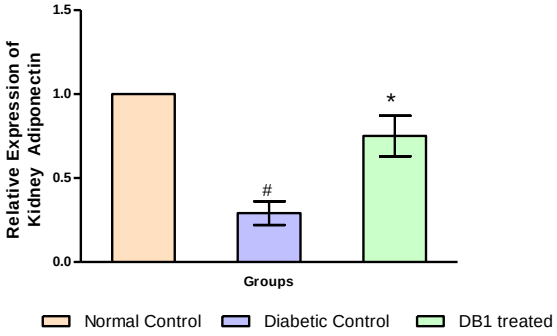


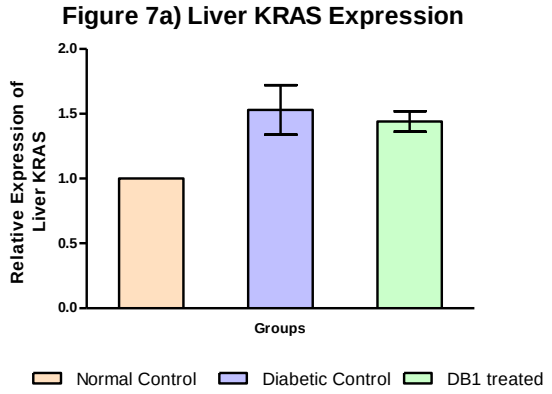

**Figure 6c) Kidney Adiponectin Expression**

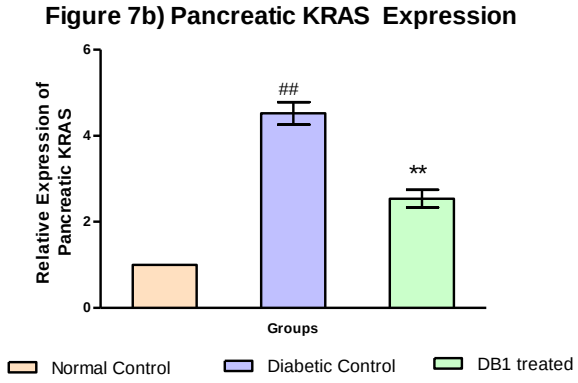


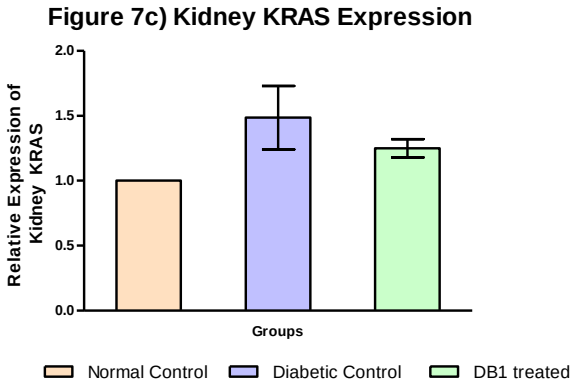

Values are expressed as mean ± SEM, n = 2; One way ANOVA followed by Dunnet's 't' test

$^{\#}p<0.05$, $^{\#\#}p<0.01$ when compared to normal control; *p<0.05, **p<0.01 when compared to diabetic control

**Figure 7 Effect of DB1 on KRAS expression in Liver, Pancreatic and Kidney of nicotinamide-streptozotocin induced diabetic rats**



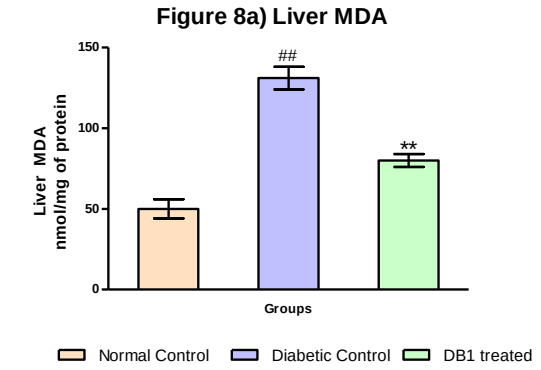



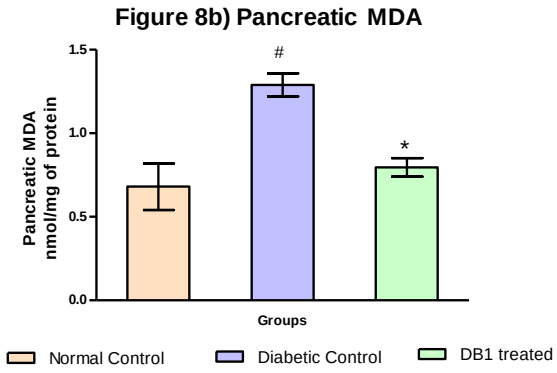



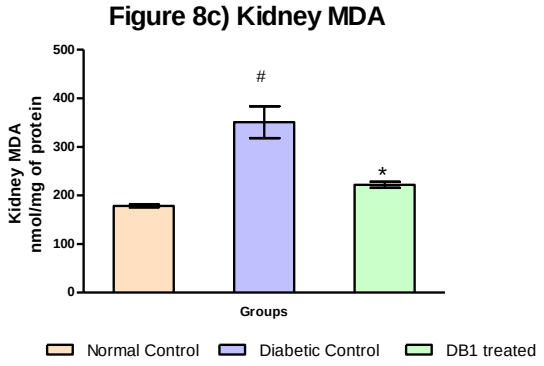

Values are expressed as mean ± SEM, n = 2; One way ANOVA followed by Dunnet's 't' test

$^{\#\#}p<0.01$when compared to normal control; **$p<0.01$ when compared to diabetic control

**Figure 8 Effect of DB1 on MDA level (nmol/mg of protein) in Liver, Pancreatic and Kidney of nicotinamide-streptozotocin induced diabetic rats**




Values are expressed as mean ± SEM, n = 2; One way ANOVA followed by Dunnet's 't' test

$^{\#}p<0.0$, 5 $^{\#\#}p<0.01$, when compared to normal control; *p<0.05, **p<0.01 when compared to diabetic control