Efficacy of different Feiolix doses in high fat diet (HFD) induced diabetic mice

ABSTRACT

OBJECTIVE

To evaluate the efficacy of different Feiolix dosages in supporting metabolic health in high-fat diet (HFD)-induced diabetic mice.

METHODS

This study used 48 healthy mice, divided into treatment and control groups. Diabetes was induced in all groups except the non-diabetic control by feeding an HFD for 8 weeks, followed by a standardized diet. Diabetic mice with postprandial blood glucose >200 mg/dL were treated with Feiolix (100 mg, 300 mg, 700 mg, 1150 mg, or 2300 mg) or metformin. HFD-control mice received no treatment. Outcomes, including fasting blood glucose, triglycerides (TG), total cholesterol, LDL, HDL, and body weight, were measured at baseline, 8 weeks, and 24 weeks. Statistical analyses included one-way ANOVA and Tukey's adjustment, with $p < 0.05$ considered significant.

RESULTS

Fasting Glucose

All Feiolix dosages reduced fasting blood glucose compared to HFD-control. Feiolix dose of 300 mg and 1150 mg was as effective as metformin in reducing blood glucose, while 2300 mg outperformed both metformin and non-diabetic controls.

Body Weight

Only the 2300 mg Feiolix dose prevented weight gain and showed significant reductions compared to all control groups.

Triglycerides and LDL

All Feiolix dosages, except 100 mg, were significantly better than HFD-control in reducing TG and LDL levels. The 300 mg and 2300 mg doses matched metformin's efficacy.

HDL

Feiolix at 2300 mg significantly improved HDL levels, while other doses prevented the decline observed in HFD-control mice, maintaining levels comparable to metformin.

Total Cholesterol

High doses (1150 mg and 2300 mg) were as effective as metformin in reducing total cholesterol, with significant improvements over HFD-control and non-diabetic controls.

CONCLUSION

The lower dose of 300 mg Feiolix was as effective as metformin in improving key metabolic parameters, including blood glucose, TG, LDL, and HDL levels. The high dose of 2300 mg prevented weight gain and outperformed metformin and non-diabetic controls in several parameters. These findings support Feiolix as a promising ingredient to support metabolic health.

DETAILED REPORT

METHODS

Study Design

Healthy mice (n=48) were used for the study. All the mice except (non-diabetes control group) were fed with High fat diet (HFD) for 8 weeks to induce diabetes and thereafter fed standardised diet. Mice with postprandial blood glucose >200 mg/dL were included in the study and treated with either Feiolix or metformin. HFD-control mice did not receive any treatment.

Study Duration: total of 24 weeks (8 weeks HFD + 16 weeks treatment).

Parameters analysed: Fasting blood glucose, Total cholesterol (CHOL), High density lipoproteins (HDL), Low density lipoprotein (LDL) triglycerides (TG), total cholesterol, triglycerides were measured at day 0, 8th week, and 24th week.

Treatments used:

Different Feiolix dosage (human equivalent**) –** 100 mg, 300 mg, 700mg, 1150mg and 2400 mg

Negative control (HFD control): HFD for 8 weeks and no treatment until week 24

Metformin control: HFD for 8 weeks and metformin treatment until week 24 (positive control)

Non-diabetic control: Healthy mice not provided high fat diet but standardised diet through the study period.

Statistics

Statistical analysis was conducted to assess the magnitude of change from 24 weeks (end of intervention) to 8 weeks (disease development). A one-way ANOVA was performed, followed by pairwise comparisons using Tukey's adjustment. Each dosage was compared against the three control groups, with a significance threshold of $p < 0.05$.

RESULTS AND INTERPRETATION

For this study, the treatment is considered effective if any of the Feiolix dosage is better than HFD control group (which did not receive any treatment) or as effective as Metformin control or non-diabetic control.

Fasting blood glucose

The lowest dose of 300 mg was as effective as metformin and non-diabetic control (p value >0.05) and significantly lower than HFD control (p <0.05). Similar pattern was seen for 1150 mg as well. Interestingly, 700 mg was significantly better in reducing blood glucose compared to HFD control (p <0.05) but not as effective as metformin or non-diabetic control (p <0.05). Moreover, 2300 mg of Feiolix outperformed metformin and non-diabetic control (p<0.05)

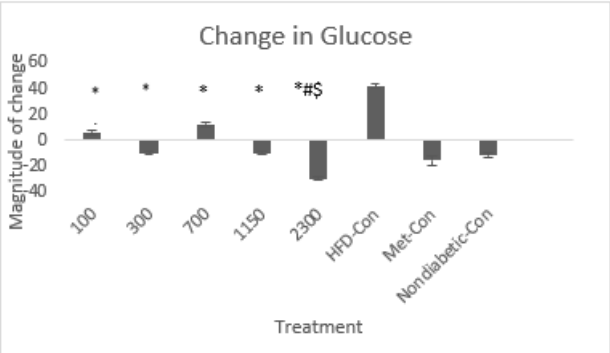

Fig 1. Change in glucose form week 24 to week 8

HFD-con: High fat diet control; Met-con: Metformin control; Non diabetic-Con: Nondiabetic control; * significantly better than HFD control, # significantly better than Met-con and $ significantly better than non-diabetic control

Body Weight

At the end of the intervention, body weight increased in all the groups including control mice (metformin control, non- diabetic control and HFD control) **except** the mice that received 2300 mg Feiolix. Mice receiving 2300 mg Feiolix showed significantly lower weight gain compared to all the 3 controls.

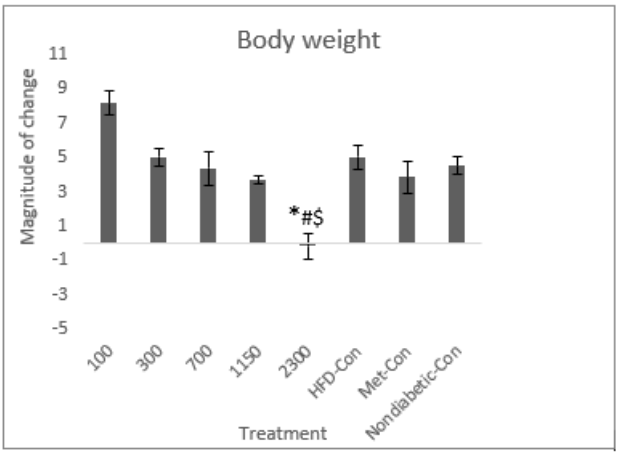

Fig 2. Change in body weight from week 24 to week 8

HFD-con: High fat diet control; Met-con: Metformin control; Non diabetic-Con: Nondiabetic control; * significantly better than HFD control, # significantly better than Met-con and $ significantly better than non-diabetic control

Triglyceride

All of the Feiolix dosages tested (except 100 mg) were significantly better than HFD control. The lowest dose of 300 mg and highest dose of 2300 mg Feiolix was as effective as metformin ($p > 0.05$) and significantly better than HFD control or non-diabetic control to reduce the triglyceride level ($p < 0.05$).

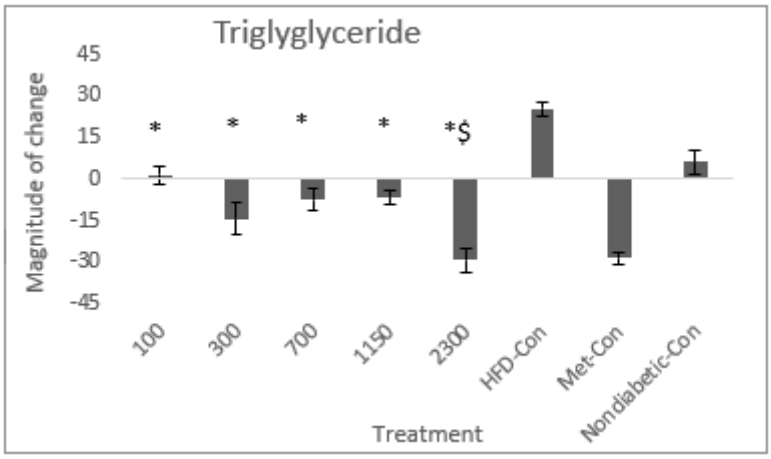

Fig 3. Change in triglycerides from week 24 to week 8

HFD-con: High fat diet control; Met-con: Metformin control; Non diabetic-Con: Nondiabetic control; * significantly better than HFD control, and $ significantly better than non-diabetic control

Total cholesterol

Higher doses of 1150 and 2300 mg Feiolix were significantly better than HFD control or non-diabetic control ($p < 0.05$) and as effective as metformin ($p > 0.05$) in reducing the total cholesterol. 300 mg and 700 mg were as effective as metformin in reducing the total cholesterol.

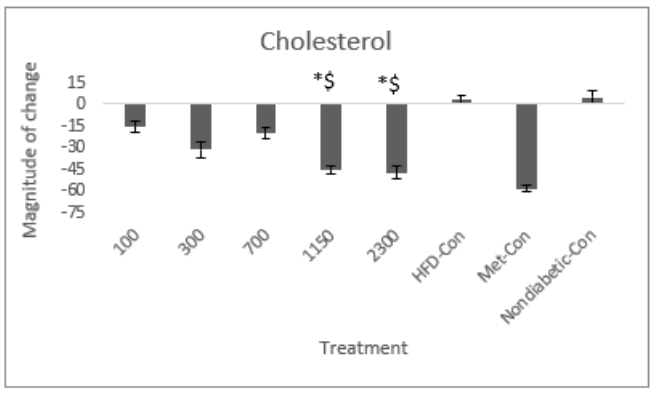

Fig 4. Change in total cholesterol from week 24 to week 8

HFD-con: High fat diet control; Met-con: Metformin control; Non diabetic-Con: Nondiabetic control; * significantly better than HFD control, and $ significantly better than non-diabetic control

LDL cholesterol

All of the Feiolix dosages were significantly better than HFD control and as effective as metformin in reducing LDL-cholesterol. Moreover, 2300 mg was better than non-diabetic control group in reducing LDL-cholesterol.

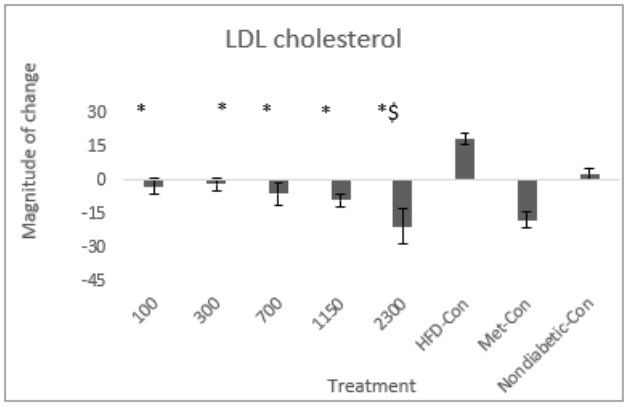

Fig 5. Change in LDL-cholesterol from week 24 to week 8

HFD-con: High fat diet control; Met-con: Metformin control; Non diabetic-Con: Nondiabetic control; * significantly better than HFD control, and $ significantly better than non-diabetic control

HDL cholesterol

High dose of Feiolix (2300 mg) significantly improved HDL level compared to HFD control or non-diabetic control. All other Feiolix dosages prevented the decline in HDL cholesterol as observed by HFD control and were as good as metformin ($p > 0.05$).

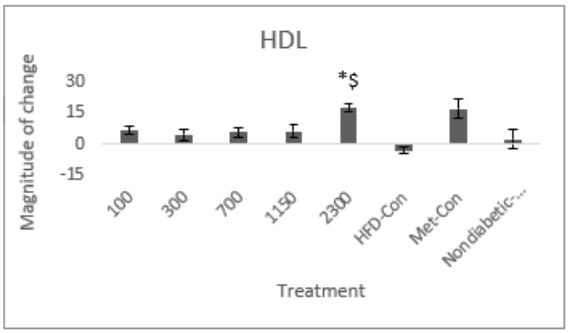

Fig 6. Change in HDL-cholesterol from week 24 to week 8

HFD-con: High fat diet control; Met-con: Metformin control; Non diabetic-Con: Nondiabetic control; * significantly better than HFD control, and $ significantly better than non-diabetic control

CONCLUSION

The lowest dose of 300 mg of Feiolix was as effective as metformin and significantly better than HFD control to improve blood glucose, triglycerides and LDL cholesterol. Also, this dose maintained the HDL level similar to metformin and non-diabetic control and prevented the decline as seen in HFD control. High dose of 2300 mg prevented the weight gain compared to all the controls and in many parameters (glucose, body weight) even outperformed the metformin and non-diabetic control. All Feiolix doses were significantly better than HFD control for reducing blood glucose after HFD for 8 weeks. These findings highlight Feiolix's potential in supporting metabolic health.

Parameters Analysed (p value)						
Comparison	**Blood glucose**	**Body weight**	**Triglycerides**	**Cholesterol**	**LDL**	**HDL**
HFD-con vs 100	**<0.001**	0.08	**<0.001**	0.75	**0.02**	0.33
HFD-con vs 300	**<0.001**	1.00	**<0.001**	0.07	**0.02**	0.61
HFD-con vs 700	**<0.001**	1.00	**<0.001**	0.50	**<0.001**	0.45
HFD-con vs 1150	**<0.001**	0.93	**<0.001**	**<0.001**	**<0.001**	0.35
HFD-con vs 2300	**<0.001**	**0.00**	**<0.001**	**<0.001**	**<0.001**	**0.00**
Met-con vs 100	**<0.001**	**0.00**	**<0.001**	**0.03**	0.19	0.22
Met-con vs 300	0.38	0.97	0.20	0.42	0.15	0.08
Met-con vs 700	**0.00**	1.00	**0.01**	0.07	0.53	0.14
Met-con vs 1150	0.39	1.00	**0.01**	0.96	0.83	0.20
Met-con vs 2300	**<0.001**	**0.02**	1.00	0.98	1.00	1.00
Nondiabetic-con vs100	**<0.001**	**0.02**	0.99	0.67	0.99	0.99
Nondiabetic-con vs 300	1.00	1.00	**0.01**	0.05	1.00	1.00
Nondiabetic-con vs 700	**<0.001**	1.00	0.27	0.42	0.83	1.00
Nondiabetic-con vs 1150	1.00	1.00	0.35	**0.00**	0.52	0.99
Nondiabetic-con vs 2300	**<0.001**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**

Supplementary table: Comparison of Feiolix dosage with controls.