

Effects of *Trigonella foenum graecum* and sodium orthovanadate on Altered Pancreatic Functions in Alloxan Diabetic Rats

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Disclosures for all authors

- None

Objectives

The present study was carried out to observe, the antihyperglycemic and renoprotective effect of sodium orthovanadate (SOV) and *Trigonella foenum graecum* seed powder (TSP) administration on blood glucose, renal functions, expression of glucose transporter, DNA fragmentation, and oxidative stress markers in pancreatic and kidney tissues

And to see whether the treatment with SOV and TSP was capable of reversing the diabetic effects.

To explore the prospect of using low doses of vanadate in combination with *Trigonella* seed powder (TSP) and evaluate their antidiabetic effect on altered metabolites in alloxan-diabetic rats.

Schematic Presentation of Experimental Design



Female Wistar rats
180-220gm



Control (Given
vehicle only)



Diabetes was induced by
using alloxan monohydrate
injection , (15mg/100 gm body
wt.) subcutaneously.

2IU/day insulin for next 6 days

Rats with $>300\text{mg/dl}$ glucose divided into experimental groups

D

D+I
(2IU/day)

D+T
(5%)

D+V
(0.6mg/ml)

D+T+V
(5%+ 0.2mg/ml)



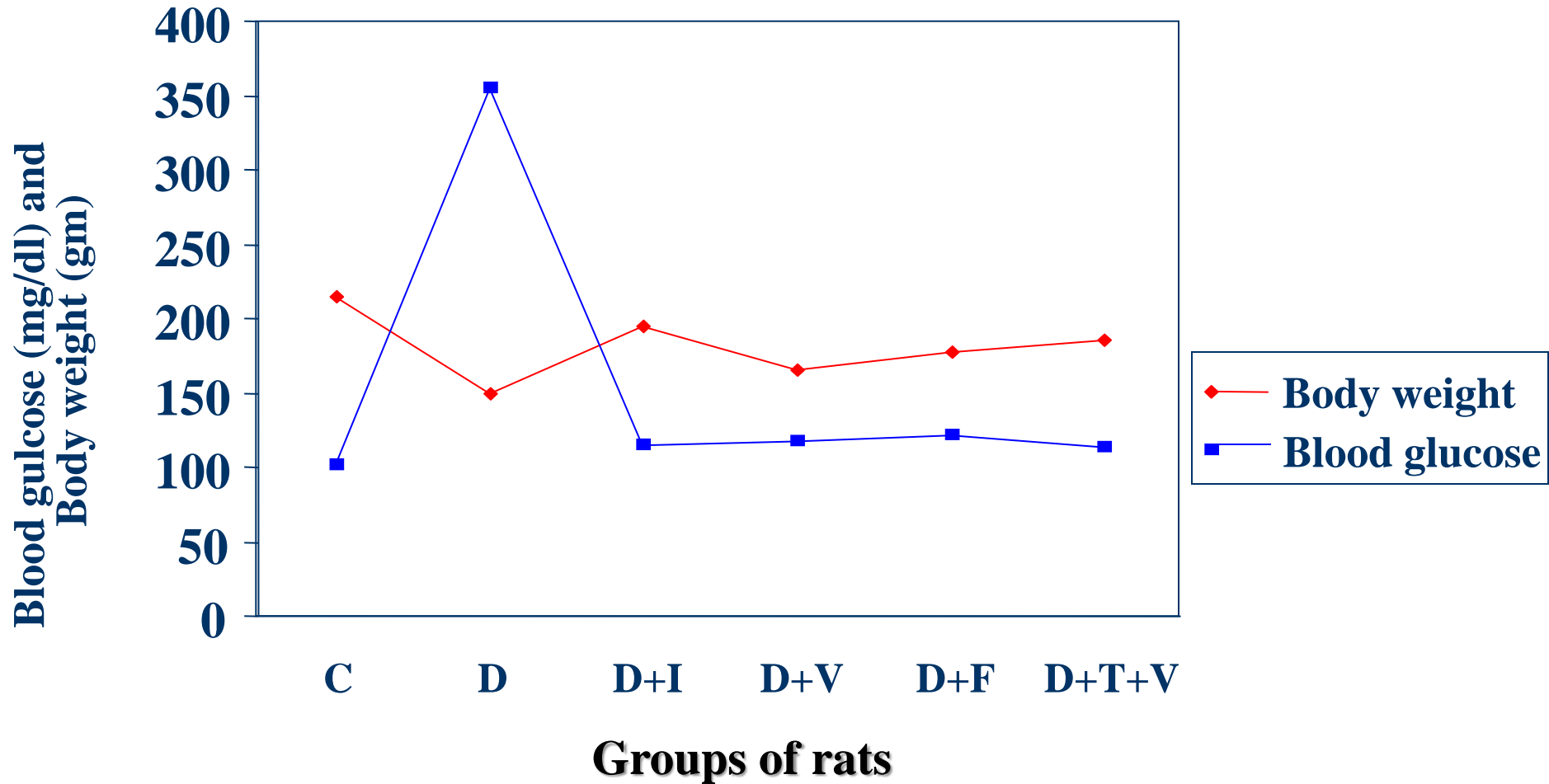
Tissues



Rats were sacrificed after 21 days

Further Study

Results



Changes in body weight and blood glucose in control, diabetic and diabetic rats after treatment with various anti diabetic compounds for 21 days.

Changes in the activity of Na⁺/K⁺ ATPase enzyme

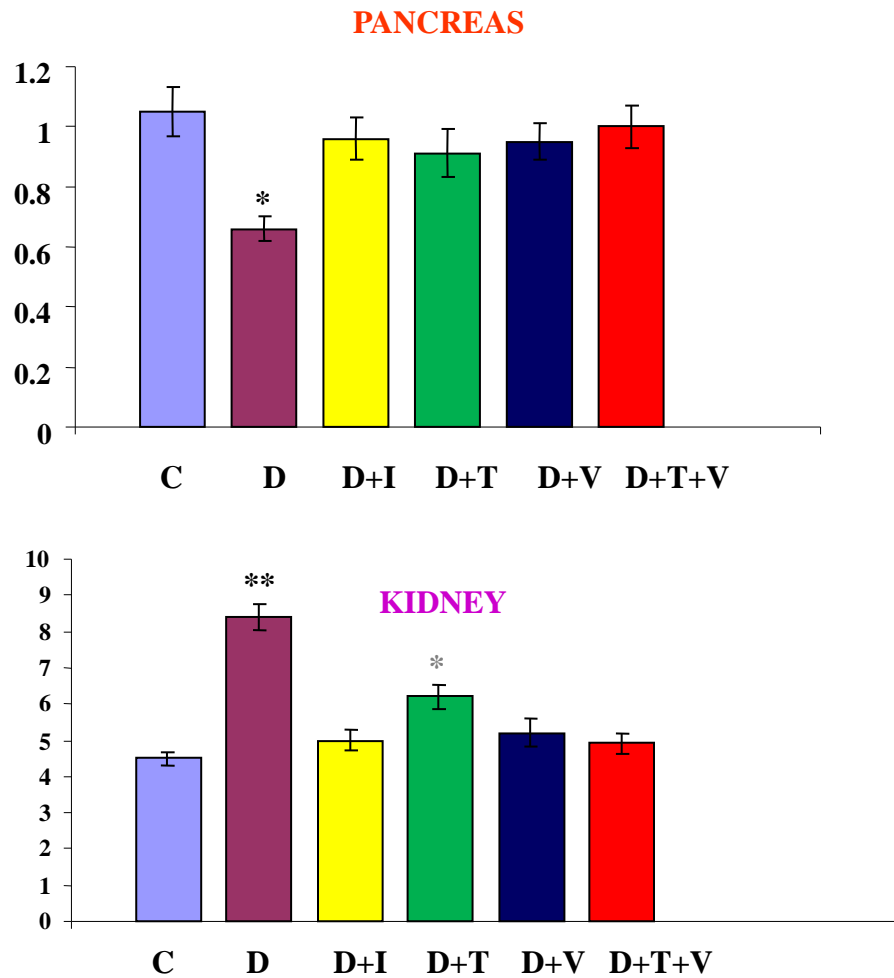


Fig. Changes in the activity of Na⁺/K⁺ ATPase enzyme in Pancreas and Kidney of Control (C), Diabetic (D) and Diabetic treated rats with insulin (D+I), *Trigonella* (D+T), vanadate (D+V) and combined dose of *Trigonella* and vanadate (D+T+V) after 21 days of treatment. Each value is a mean of \pm SEM of five or more separate experiments. P values are ***p<0.001, **p<0.01, *p<0.05. One unit of enzyme activity is as one μ mole of Pi released per mg protein per minute.

Changes in membrane fluidity in membrane fraction

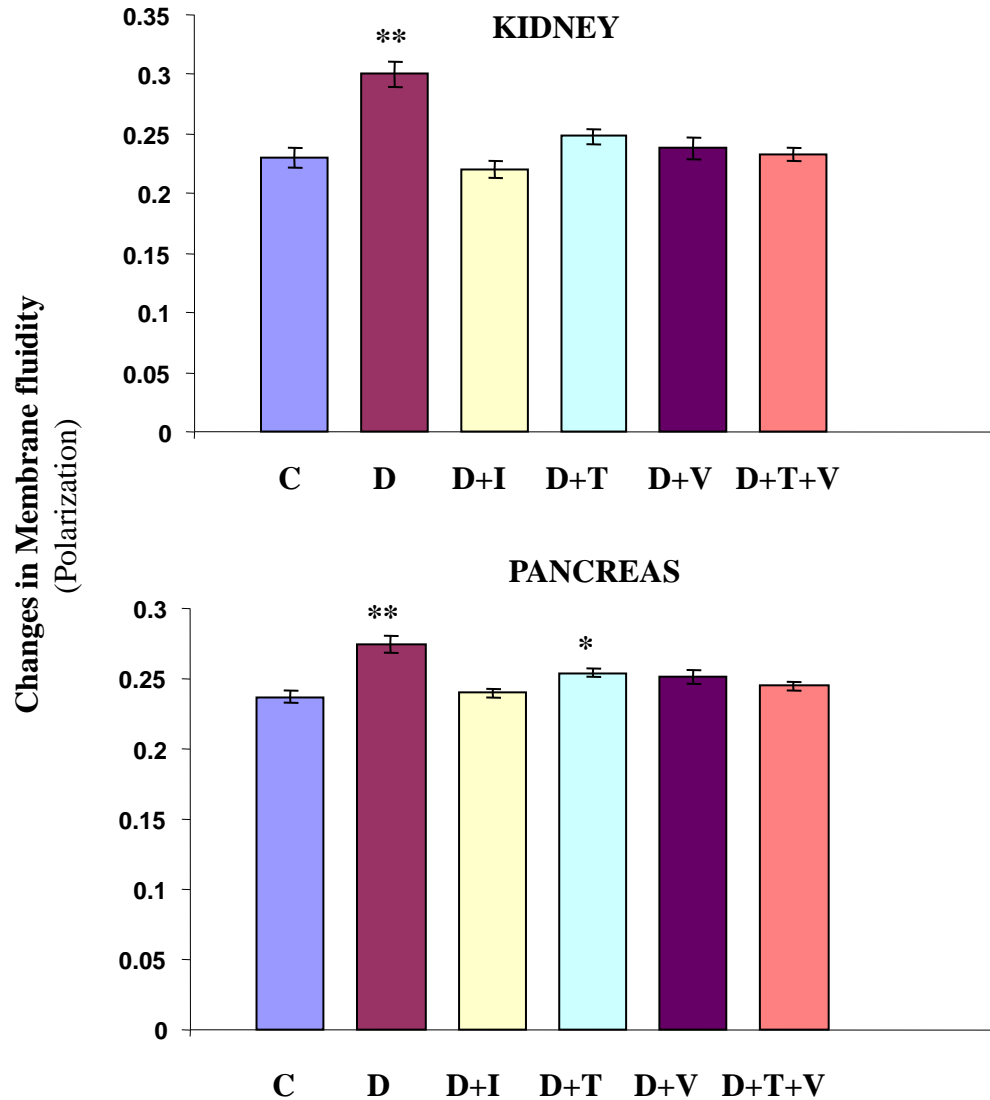
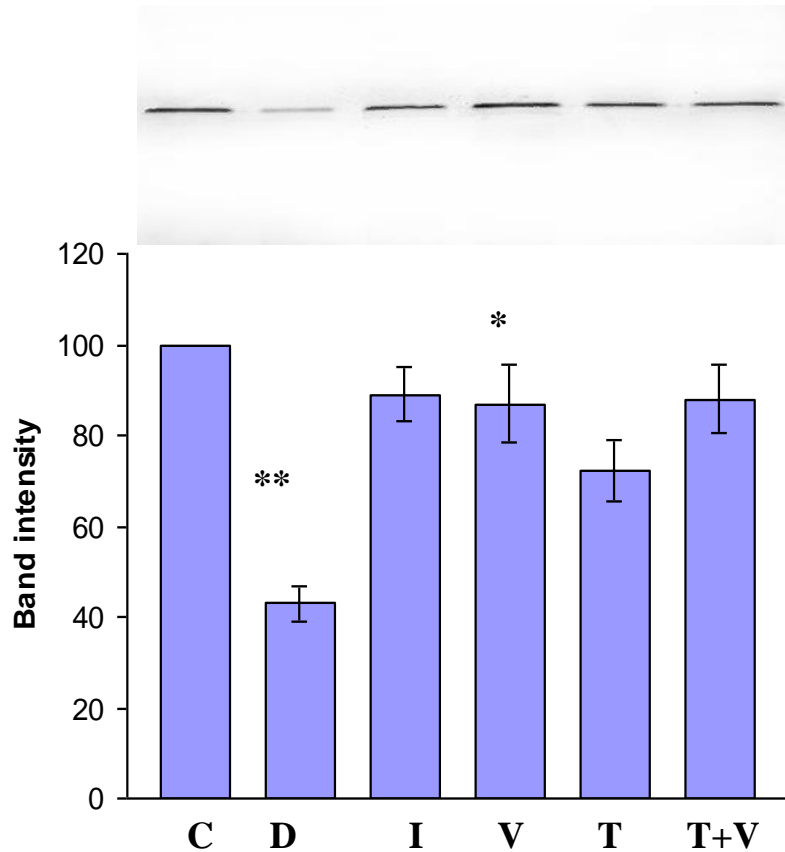


Fig : Changes in membrane fluidity of Control, Diabetic and Diabetic treated rats with insulin (D+I), *Trigonella* (D+T), vanadate (D+V) and combined dose of *Trigonella* and vanadate (D+T+V) after 21 days of treatment. Each value is a mean of \pm SEM of five or more separate values from two to three experiments. Fisher's P values are **p<0.001, *p<0.05.

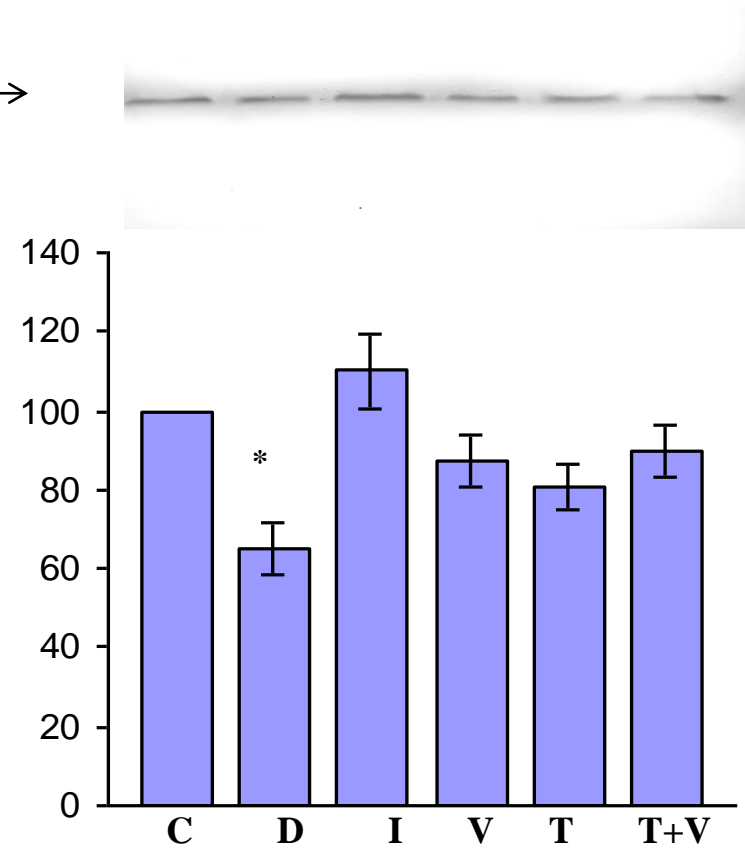
Changes in Glucose transporter (GLUT4) levels

Total Membrane Fraction



Skeletal Muscle

Total Membrane Fraction



Kidney

Results are expressed as mean \pm SEM of 5 separate experiments, **p < 0.01, *p < 0.05

Lipid peroxidation levels

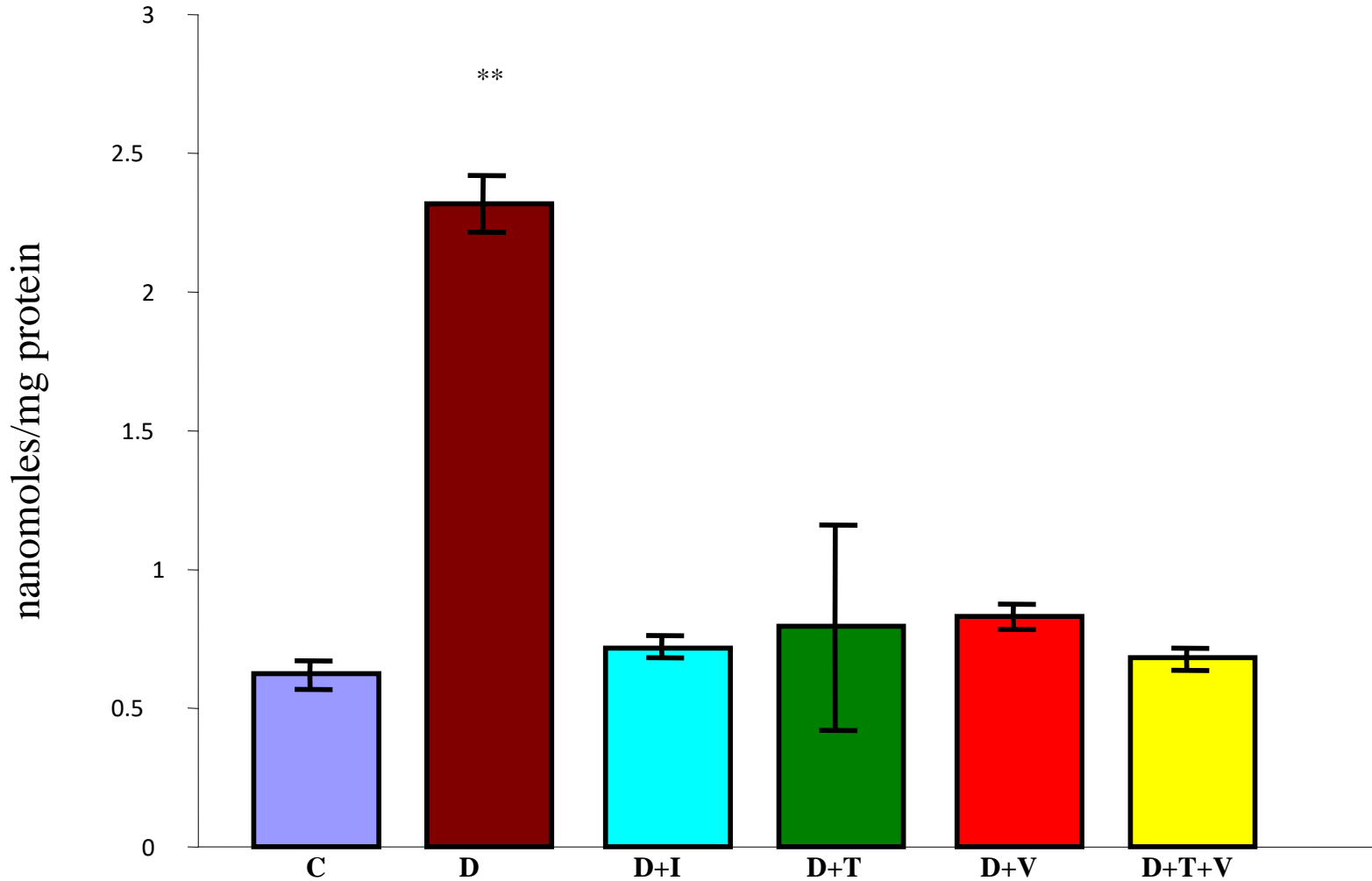


Figure : Thiobarbituric Acid reacting Species (TBARS) levels in the kidney of control, diabetic and diabetic rats after treatment with various antidiabetic compounds for 21 days. Results are expressed as mean \pm SEM of 5 separate experiments, ** $p < 0.01$, * $p < 0.05$

Summary of Results

Parameters changes	Alloxan Diabetes	Trigonella+ Vanadate treated
• Body weights	↓	↑
• Glucose levels	↑	↓
• Glucose transpoter	↓	↑
• Lipid peroxidation	↑	↓
• Na+K+ATPase	↓	↑
• Renal functions	↓	↑
• Calcium levels	↑	↓
• Membrane fluidity	↓	↑

Conclusion : Our investigation leads us to conclude that SOV and Trigonella administration to diabetic rats significantly and effectively reversed the diabetic aberrations studied, combined SOV and *Trigonella* brought back the serum insulin levels, decreased in diabetic animals, to that of the control levels probably by rejuvenating left over beta cells in the diabetic pancreas. Therefore combined therapy can indeed be considered a better alternative to be explored further as a means of diabetic control.