OP-035 [Apitherapy]
Therapeutic Effects of Bee Venom on Hyperglycemia and Kidney Dysfunction in Alloxan-Induced Diabetic Rabbits

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Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia, which leads to complications affecting the eyes, kidneys, cardiovascular system, and peripheral nerves. Among these complications, diabetic nephropathy is a major contributor to long-term morbidity and mortality in affected individuals. Bee venom has emerged as a potential therapeutic agent in the management of diabetes, due to its potent hypoglycemic, hypolipidemic, and antioxidant properties.

The primary objective of this study is to evaluate the therapeutic potential of bee venom (Apis mellifera) in mitigating renal dysfunction in an alloxan-induced diabetic rabbit model.

Twenty-two Chinchilla rabbits were divided into three experimental groups: Group 1 served as untreated control, Group 2 was designated as the positive control and administered metformin (7.14 mg/kg) daily, and Group 3 received bee venom (0.3 mg/kg) (BVT) every other day. The duration of the experiment spanned 14 days.

RESULTS: bee venom treatment (BVT) lead to significant metabolic improvements compared to the control group, the BVT group exhibited a 26.5% reduction in blood glucose levels. Additionally, plasma creatinine and urea levels decreased by 19.8% and 14.7%, respectively. Similarly, blood urea nitrogen (BUN) levels were reduced by 14.8%. Furthermore, histological analysis showed that the kidneys of the BVT group demonstrated recovery and expansion of the glomeruli, with normal shape and size, and normal Bowman's space. Toxicity-related changes in the epithelial cells of the proximal convoluted tubules were reduced, and cellular damage was notably ameliorated.

The results indicate that bee venom exerts a renoprotective effect by reducing blood glucose levels and attenuating renal dysfunction.

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KHULAN TSERENNADMID

Ph.D., and Clinical Professor.

Founder and the president of Mongolian Apitherapy Association.

Professional background

1987 – Bachelor of Medical Sciences, MNUMS

1990 – Residency training in Internal Medicine, MNUMS

2004 – Master of Medical Science, MNUMS

2006 – Residency training in Chinese Traditional Medicine.

2008 – Certified training in Apitherapy.

2012 – Certified training in BVT for addictions, the Research Institute of Clinical Apitherapy, Russian Federation.

2016 – Ph.D. in Medical science, MNUMS

2024 – Clinical Professor, MNUMS

First Apitherapy specialist in Mongolia

Dr. Khulan has an extensive practice in bee venom therapy in combination with manual therapy, and western medicine. She has treated over **40,000 patients** since 2008.

Background

Diabetes Mellitus

- Chronic metabolic disorder → persistent hyperglycemia
- Major complications: nephropathy, retinopathy, neuropathy

Why Bee Venom Therapy?

- Hypoglycemic, hypolipidemic, antioxidant properties
- Limited evidence on renal protection

Study Objective

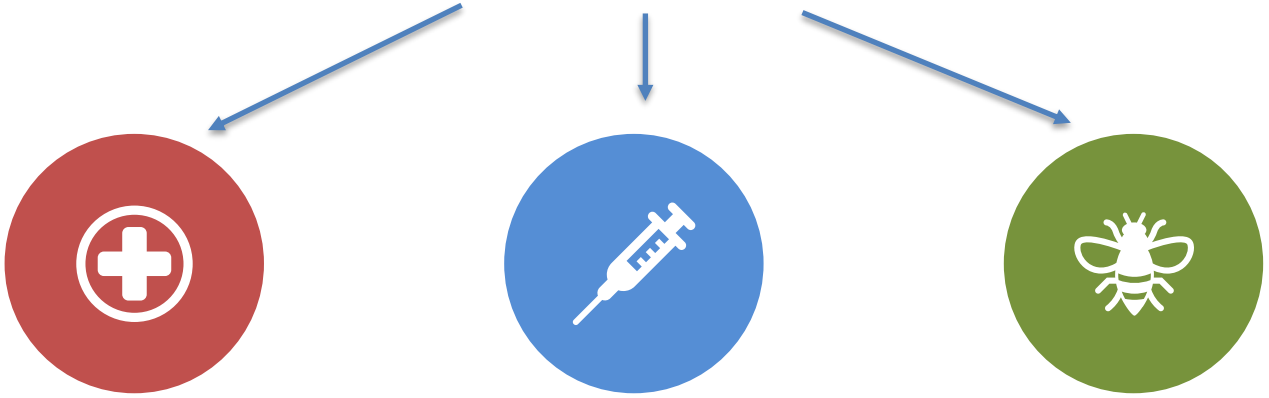
Evaluate the therapeutic potential of bee venom

Alloxan-induced diabetic rabbit model

Focus on Renal dysfunction & hyperglycemia

Experimental Design

22 CHINCHILLA RABBITS DIVIDED INTO 3 GROUPS



CONTROL

(diabetic)

METFORMIN

(7.14 mg/kg daily)

BEE VENOM

(0.3 mg/kg, every other day)

Methods

Biochemical Analysis

- Blood glucose
- Creatinine
- Urea
- Blood Urea Nitrogen (BUN)

Histological Analysis

Kidney tissue examined for:

- Glomerular structure
- Bowman's space
- Proximal convoluted tubules

Results: Biochemical Analysis

Blood Glucose

- Bee Venom treatment: reduced blood glucose levels by 26.5% compared to the control group by the day 14.
- Significant improvement in hyperglycemia

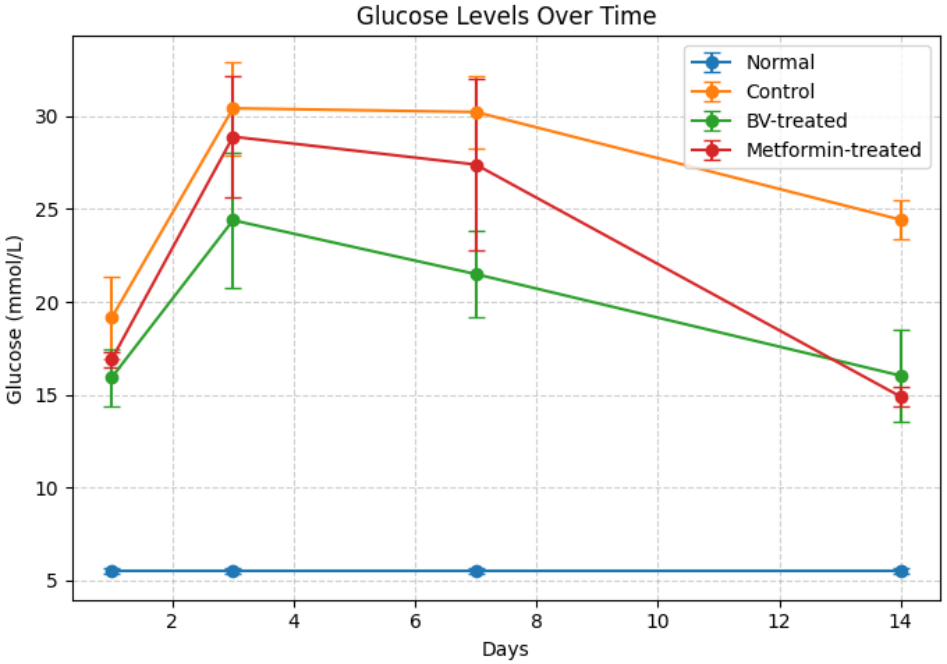


Figure 1. Glucose levels in experimental groups.

Results: Biochemical Analysis

Kidney Function Markers

- Creatinine ↓ 19.8%
- Urea ↓ 14.7%
- BUN ↓ 14.8
- Indicates **Renoprotective effects**

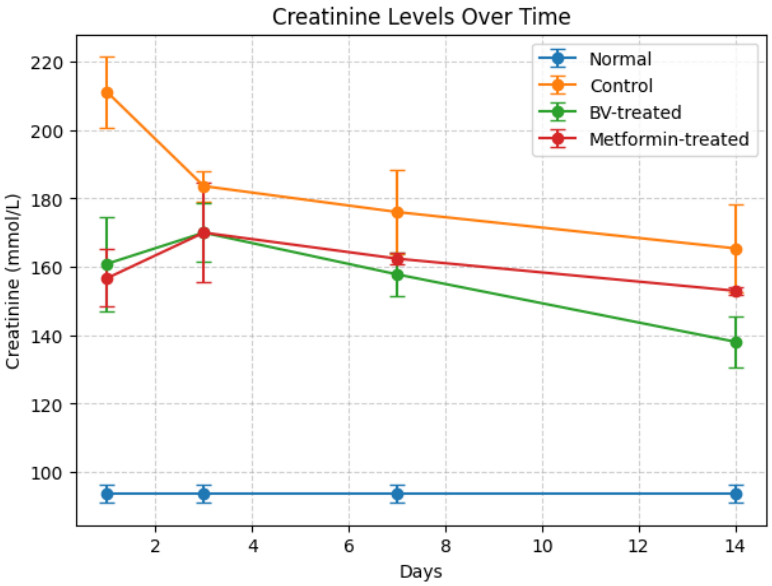


Figure 2. Creatinine levels in experimental groups.

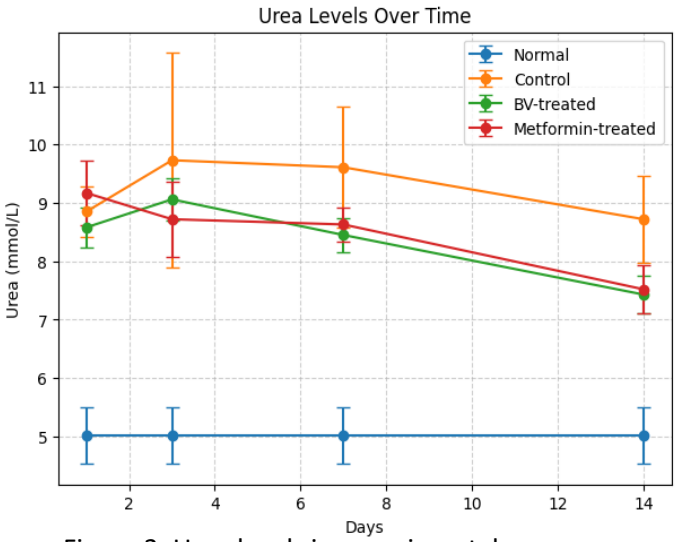


Figure 3. Urea levels in experimental groups.

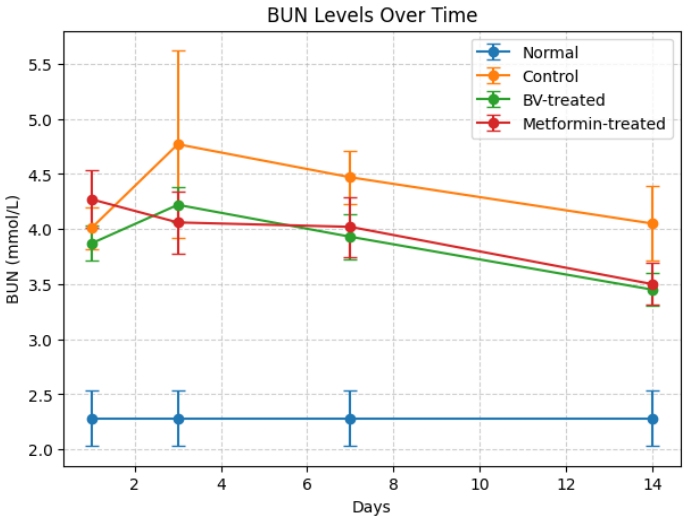


Figure 4. Blood urea nitrogen (BUN) levels in experimental groups.

Results: Histology

- BVT kidneys: normal glomeruli, Bowman's space preserved
- Reduced tubular epithelial damage

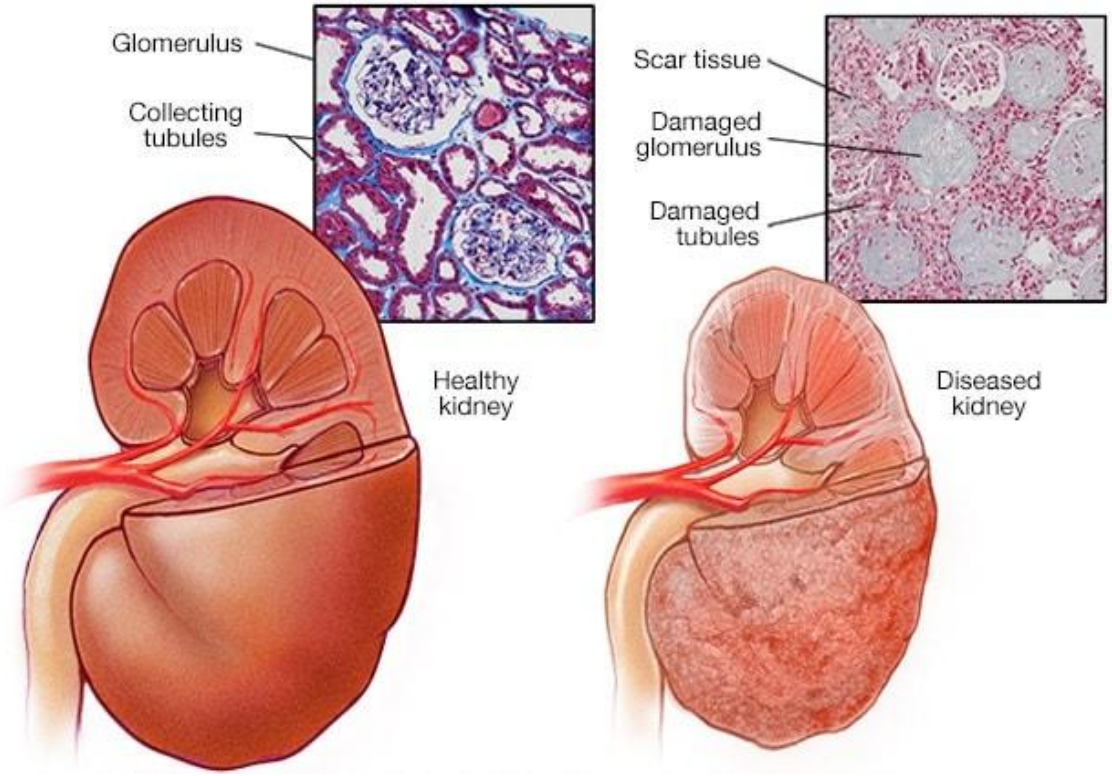


Image: Healthy kidney vs diseased kidney

Mayo Clinic Staff. (2023, October 24). *Healthy kidney vs diseased kidney* [Image]. In *Diabetic nephropathy (kidney disease): Symptoms and causes*. Mayo Clinic. https://www.mayoclinic.org/diseases-conditions/diabetic-nephropathy/symptoms-causes/syc-20354556

Results: Histological Analysis

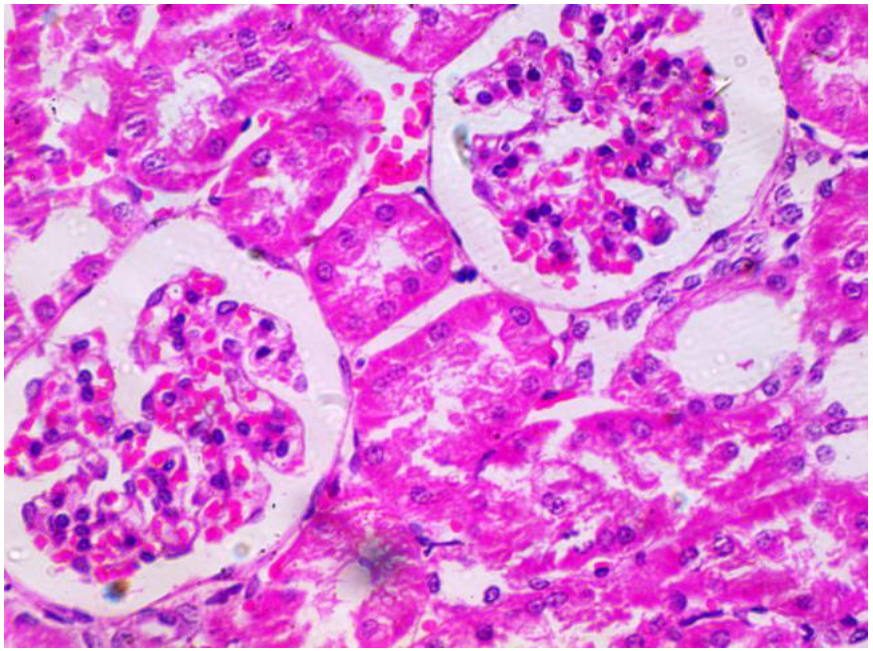


Figure 5. Normal group: Renal tissue shows intact glomeruli with open capillary loops, normal mesangial matrix, and well-preserved tubular architecture.

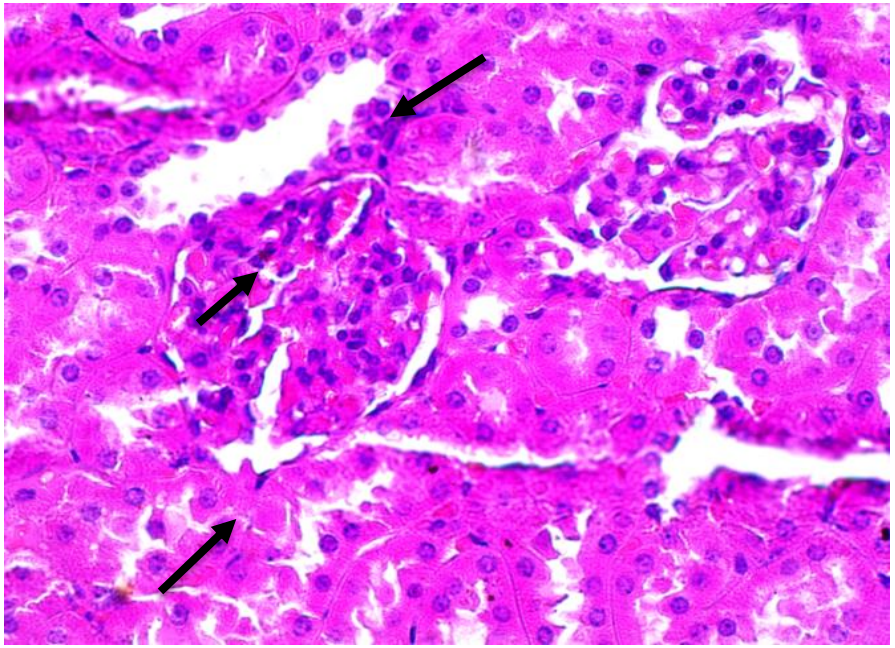


Figure 6. Diabetic control group: Kidneys display marked glomerular hypertrophy, mesangial expansion, and partial obliteration of capillary lumens, accompanied by tubular vacuolation and structural degeneration.

Results: Histological Analysis

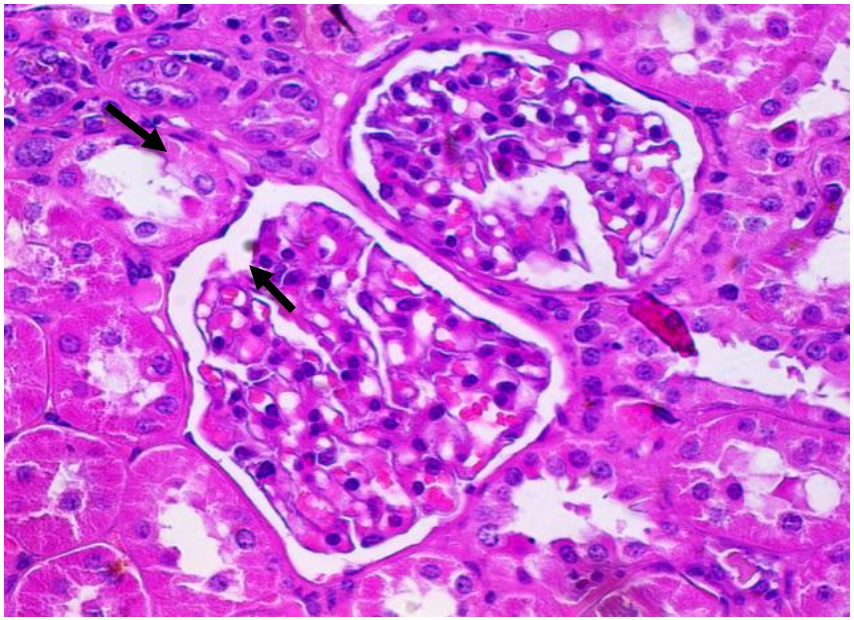


Figure 7. Bee venom–treated group:
Renal morphology demonstrates clear improvement, with reduced mesangial expansion, more open glomerular loops, and better-preserved tubular epithelium compared to the diabetic control group.

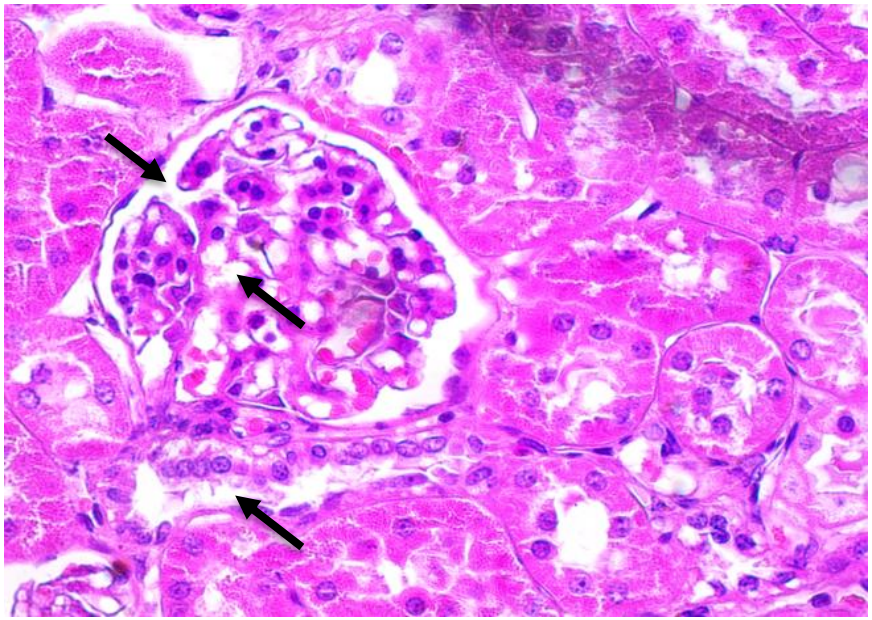


Figure 8. Metformin-treated group: Kidneys show moderate improvement, with partial restoration of glomerular and tubular structure and reduced mesangial changes, though less pronounced than in the bee venom–treated group.

Conclusion

Bee venom treatment

- Improves glucose homeostasis
- Protects kidney structure and function
- Potential adjunct in diabetes therapy

Thank you for your attention!

We welcome your questions.

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