## Qeios

### Peer Review

# Review of: "Development of a Type 2 Diabetes Mellitus Model in Rats with Administration of High-Fat Diet and Streptozotocin"

#### Tengku Ahmad Damitri Al Astani Tengku Din<sup>1</sup>

1. Department of Chemical Pathology, School of Medical Sciences, Universiti Sains Malaysia, Malaysia

1. Title

Original:

"Development Of A High-Fat Diet And Low-Dose Streptozotocin-Induced Rat Model For Type 2 Diabetes Mellitus"

Suggested Revision:

"A High-Fat Diet and Low-Dose Streptozotocin Rat Model of Type 2 Diabetes Mellitus"

- Rationale: More concise, removes redundancy ("Induced"), and aligns with journal style (title case).

2. Abstract

**Restructured Example:** 

Background: Type 2 diabetes mellitus (T2DM) is characterized by insulin resistance and  $\beta$ -cell dysfunction. Current animal models face limitations in stability and reproducibility. Methods: Male Sprague-Dawley rats (n=6/group) were fed a high-fat diet (HFD; 60% fat) for 21 days, followed by two intraperitoneal injections of streptozotocin (STZ; 25 mg/kg). Fasting blood glucose (FBG), HbA1c, lipid profiles, and renal markers were assessed. Results: HFD/STZ rats exhibited significant hyperglycemia (FBG: 476 ± 80.88 vs. 101.16 ± 12.78 mg/dL in controls; p < 0.001), dyslipidemia, and elevated HbA1c (10.55 ± 0.57 vs. 3.71 ± 0.15 g/L; p< 0.001).

Conclusion: This protocol reliably induces T2DM with metabolic and renal complications, providing a robust preclinical model.

1

3. Introduction

Added Citations & Clarity:

> "Global diabetes prevalence exceeds 540 million cases, with 240 million undiagnosed (IDF, 2023). While STZ models are widely used, high doses (e.g., 30 mg/kg) increase mortality (Zhang et al., 2008). Our modified protocol (25 mg/kg STZ) balances  $\beta$ -cell damage and survival, addressing this gap."

Rationale:

- Cites International Diabetes Federation (IDF) for epidemiology.

- Explicitly justifies the 25 mg/kg dose.

4. Methods

Added Details (Randomization & Blinding):

> "Rats were randomly assigned to groups using a computer-generated sequence (GraphPad Prism v9). Investigators measuring outcomes were blinded to group allocation."

STZ Preparation Clarification:

> "STZ was dissolved in citrate buffer (0.1 M, pH 4.5) immediately before injection to ensure stability (Szkudelski, 2001)."

5. Statistical Analysis

**Revised Text:** 

> "Data are mean ± SEM. Group comparisons used unpaired t-tests with Welch's correction (GraphPad Prism). p< 0.05 was significant; exact p-values are reported."</p>

Rationale:

- Specifies tests and software.

- Demands exact \*p\*-values (e.g., \*p\* = 0.003 instead of \*p\* < 0.05).

6. Results

Figure 1 Description (if missing):

> "Figure 1 illustrates weight gain trajectories. The DC group showed progressive increases vs. NC (302.83

± 56.02 vs. 163.16 ± 9.95 g at endpoint; \*p\* = 0.002)."

7. Discussion

doi.org/10.32388/KGCPDV

Added Limitations Paragraph:

> "Limitations include the small sample size (n=6/group) and lack of insulin resistance confirmation via hyperinsulinemic-euglycemic clamp. Future studies should validate this model with larger cohorts and direct insulin measurements."

8. Conclusion

Added Future Directions:

> "This model is suitable for testing antidiabetic drugs targeting insulin resistance or  $\beta$ -cell preservation. Further work could explore long-term complications (e.g., nephropathy)."

9. References

**Fixed Examples:** 

- Original Ref 5: "Awu KK, Huan Y (2008). 'Streptozotocin-Induced Diabetic Models...'"

- Revised: "Wu, K. K., & Huan, Y. (2008). Streptozotocin-induced diabetic models in mice and rats. Current Protocols in Pharmacology, 40(1), 5.47.1–5.47.14. https://doi.org/10.1002/0471141755.ph0547s40"

10. Grammar & Clarity Edits

Original:"Due to uneven model methodologies and unexpected outcomes, a stable induced type 2 diabetes model (T2DM) still needs to be investigated..."

Revised: "Due to inconsistencies in existing methodologies, a stable T2DM model remains elusive for preclinical research."

### Declarations

Potential competing interests: No potential competing interests to declare.