




Anti-diabetic effects of electrolyzed reduced water in streptozotocin-induced and genetic diabetic mice

- [Mi-Ja Kim^a](#) ,
- [Hye Kyung Kim^b](#)  
- ^a Department of Obesity management, Graduate School of Obesity Science, Dongduk Women's University, 23-1 Wolkgukdong, Seoul, 136-714, South Korea
- ^b Department of Food and Biotechnology, Hanseo University, Sesan, 356-706, South Korea
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Abstract

Oxidative stress is produced under diabetic conditions and is likely involved in progression of pancreatic β -cell dysfunction found in diabetes. Both an increase in reactive oxygen free radical species (ROS) and a decrease in the antioxidant defense mechanism lead to the increase in oxidative stress in diabetes. Electrolyzed reduced water (ERW) with ROS scavenging ability may have a potential effect on diabetic animals, a model for high oxidative stress. Therefore, the present study examined the possible anti-diabetic effect of ERW in two different diabetic animal models. The genetically diabetic mouse strain C57BL/6J-*db/db*(*db/db*) and streptozotocin (STZ)-induced diabetic mouse were used as insulin deficient type 1 and insulin resistant type 2 animal model, respectively. ERW, provided as a drinking water, significantly reduced the blood glucose concentration and improved glucose tolerance in both animal models. However, ERW fail to affect blood insulin levels in STZ-diabetic mice whereas blood insulin level was markedly increased in genetically diabetic *db/db* mice. This improved blood glucose control could result from enhanced insulin sensitivity, as well as increased insulin release. The present data

suggest that ERW may function as an orally effective anti-diabetic agent and merit further studies on its precise mechanism.

Keywords

- Electrolyzed reduced water;
- Diabetic mice;
- Blood glucose;
- Insulin;
- Glucose tolerance

Figures and tables from this article:

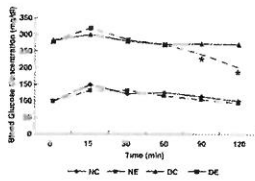


Fig. 1. Effect of electrolyzed reduced water (ERW) on glucose tolerance in streptozotocin (STZ)-induced diabetic mice. Normal ICR mice fed with tap water (NC); normal mice fed with ERW (NE); STZ-diabetic mice fed with water (DC); STZ-diabetic mice fed with ERW (DE). Data are expressed as means \pm S.E.M. $\square p < 0.01$, compared with diabetic control (DC).

[Figure options](#)

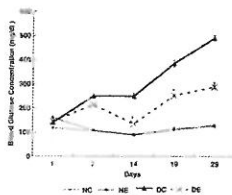


Fig. 2. Effect of electrolyzed reduced water (ERW) on blood glucose concentrations in genetically diabetic *db/db* mice. Normal *db/-* mice fed with tap water (NC); normal *db/-* mice fed with ERW (NE); *db/db* mice fed with tap water (DC); *db/db* mice fed with ERW (DE). Data are expressed as means \pm S.E.M. $\square p < 0.01$, compared with diabetic control (DC).

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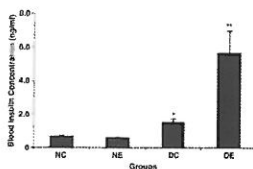


Fig. 3. Effect of electrolyzed reduced water (ERW) on blood insulin concentrations in genetically diabetic *db/db* mice. Normal *db/-* mice fed with tap water (NC); normal *db/-* mice fed with ERW (NE); *db/db* mice fed with tap water (DC); *db/db* mice fed with ERW (DE). Data are expressed as means \pm S.E.M. $\square p < 0.01$, compared with normal control (NC), $\square\square p < 0.01$, compared with diabetic control (DC).

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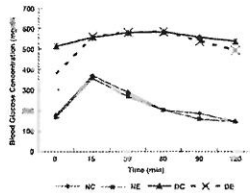


Fig. 4. Effect of electrolyzed reduced water (ERW) on glucose tolerance in genetically diabetic *db/db* mice. Normal *db/-* mice fed with tap water (NC); normal *db/-* mice fed with ERW (NE); *db/db* mice fed with tap water (DC); *db/db* mice fed with ERW (DE). Data are expressed as means \pm S.E.M.

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Table 1. Fasting blood glucose, insulin and body weight changes in streptozotocin diabetic mice

Group	Fasting Blood Glucose (mg/dl)	Insulin (μU/ml)	Body Weight (g)
NC	~100	~1.0	~25
NE	~100	~1.0	~25
DC	~300	~0.5	~20
DE	~200	~0.8	~22

Data are expressed as means \pm S.E.M. $\square p < 0.01$, compared with normal control (NC), $\square\square p < 0.01$, compared with diabetic control (DC). NC; normal ICR mice control fed tap water, NE; normal mice fed ERW, DC; STZ-diabetic mice fed water, DE; STZ-diabetic mice fed ERW.

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