

OFFICIAL ABSTRACT and CERTIFICATION

Curcumin Mitigates the Detrimental Effects of Nicotine in a Drosophila melanogaster Model of Diabetes

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The total estimated cost of diagnosed diabetes was \$327 billion in 2017, or more than 1 in 4 health care dollars. Vaping has been promoted as a safer alternative to smoking, but diabetics are at risk for complications. Nicotine triggers changes in metabolism, as well as high blood sugar levels in diabetics, which can lead to diabetes complications. However, minimal research has focused on mitigating the effects of nicotine on diabetic patients. A Drosophila melanogaster diabetic model was utilized to confirm the negative effects of nicotine, as well as to determine the plausibility of curcumin as a treatment due to its antioxidant properties. Drosophila were tested for locomotive ability, foraging behavior, and metabolic activity.

All nicotine treated groups experienced a decline in their mobility, while curcumin treatment significantly restored mobility (HS+N3vsC+HS+N3: -0.603vs-0.248). Foraging behavior was suppressed by Day 7 in all nicotine treated groups, especially those exposed to a higher concentration of nicotine within the food-seeking assays (N1vsN3: 0.675vs0.56). Again, curcumin treatment significantly restored foraging behavior. Metabolic function was immediately suppressed only in diabetic fruit flies when treated with nicotine, and remained suppressed the entire trial. The application of curcumin completely restored metabolism to control levels (HS+N1vsC+HS+N1: 360.606vs750.060).

The impact of nicotine on a diabetic Drosophila model bears similarities to the risks that diabetics face when they consume nicotine. The observed positive effects of curcumin on the diabetic model demonstrate a potential applicability of curcumin treatment in mammals.

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