

**Project ID: 101****Senior Division****Animal Sciences****Tanya Mandyam****Westview High School****Gr. 10***Circadian Rhythm Disturbance Affects Running Activity and Gut Microbiome in Rats***AWARDS:**

***San Diego County Veterinary Medical Association - Senior Division Winner  
CSEF Qualified***

Introduction: Disruption in the circadian rhythm, commonly experienced as jet lag, disturbs bodily functions and produces lethargy. Mechanisms underlying the effects of jet lag are minimally explored and inflammation with gut microbiome dysbiosis could play a role. Current methods to combat jet lag are somewhat effective, but produce unwanted side effects. Curcumin, an organic dietary supplement with proposed anti-inflammatory properties could be a promising therapy.

Problem Statement: Can curcumin diet ameliorate the effects of jet lag and produce gut microbiome eubiosis by enhancing anti-inflammatory microbiota?

Procedures: I used a rat model of jet lag and evaluated its effects on running/sleep patterns and the gut microbiome using DNA sequencing and metagenomics of feces samples. Rats were treated with vehicle (almond butter) or curcumin (40 mg/kg/day/p.o. in vehicle) and their body weight, running/sleep pattern, and the microbiome were assessed.

Results: Jet lag reduced running output by 110% and changed the gut microbiota composition. Curcumin ameliorated the effects of jet lag on running output, increased anti-inflammatory actinobacteria by 3.7%, and decreased pro-inflammatory proteobacteria by 1.9%.

Conclusions: Curcumin diet ameliorates the effects of jet lag on running/sleep patterns and also reduces gut microbiome dysbiosis by enhancing microbiota that are anti-inflammatory. My results could be used to test the effects of long-term curcumin treatment on other forms of sleep disorders (e.g. insomnia). Because curcumin reduced proteobacteria in the gut, my results could be used to test the effects of curcumin on inflammatory diseases associated with high proteobacteria levels (e.g. inflammatory bowel disease, metabolic disorders and cancers of the gut and bladder).