

## ABSTRAK

### STUDI EKSPERIMENTAL PENAMBAHAN LARUTAN SUKROSA 30% TERHADAP BERAT BADAN MENCIT MODEL GANGGUAN IRAMA SIRKADIAN

**Latar Belakang :** Obesitas merupakan masalah kesehatan utama yang menjadi tantangan bagi masyarakat karena dapat menyebabkan gangguan metabolik dalam tubuh, seperti diabetes, hipertensi, penyakit jantung koroner, dan stroke. Salah satu faktor risiko yang menyebabkan obesitas adalah konsumsi makanan dengan jumlah energi berlebih tanpa diimbangi dengan pengeluaran energi. Konsumsi makanan berlebih akibat peningkatan nafsu makan dapat dipengaruhi oleh pola tidur yang berkaitan dengan irama sirkadian. Irama sirkadian merupakan pola alamiah tubuh manusia yang berulang setiap 24 jam dan mempengaruhi banyak proses dalam tubuh, seperti pola tidur, bangun, produksi hormon, serta kinerja fisik. Ketidakseimbangan antara irama sirkadian dengan perubahan pola perilaku makan dapat menyebabkan ketidaksesuaian ritme pusat dengan ritme perifer irama sirkadian, sehingga dapat mengakibatkan disfungsi berbagai proses fisiologi tubuh, seperti gangguan homeostasis glukosa dan metabolisme lemak yang keduanya berkaitan dengan peningkatan berat badan. Kebiasaan konsumsi sukrosa dalam jumlah banyak disertai gangguan pola tidur juga menambah risiko peningkatan berat badan.

**Tujuan :** Untuk mengetahui pengaruh gangguan irama sirkadian dan konsumsi larutan sukrosa 30% terhadap perubahan berat badan hewan model mencit *Mus musculus*.

**Metode :** Studi eksperimental dilakukan selama 14 hari dengan subjek 20 ekor mencit *Mus musculus*. Mencit dibagi empat kelompok perlakuan NLD-Aquades, ILD-Aquades, NLD-Sucrose, dan ILD-Sucrose. Sukrosa diberikan dalam bentuk larutan sukrosa 30% sebagai asupan tambahan, gangguan irama sirkadian diberikan dengan membalik pola pencahayaan hewan mencit. Perubahan berat badan diukur di awal dan di akhir penelitian. Analisis data menggunakan *One-Way ANOVA* dan *Repeated Measured ANOVA* dengan uji normalitas *Shapiro-Wilk Test*.

**Hasil :** Tidak terdapat perbedaan rata-rata berat badan mencit antar kelompok pada  $H_0$  ( $P > 0,05$ ), tetapi pada  $H_{14}$  terdapat perbedaan rata-rata berat badan mencit antar kelompok secara signifikan ( $P < 0,05$ ) yaitu antara kelompok NA-NS, kelompok IA-NS, dan kelompok IA-IS. Mencit kelompok NS mengalami penurunan berat badan secara signifikan selama intervensi ( $P < 0,05$ ), sedangkan mencit kelompok NA, IA, dan IS tidak mengalami perubahan berat badan secara signifikan selama intervensi ( $P > 0,05$ ).

**Kesimpulan :** Pengaruh konsumsi larutan sukrosa 30% dan gangguan irama sirkadian terhadap berat badan dalam penelitian ini berbeda dengan penelitian sebelumnya yang menunjukkan adanya peningkatan berat badan signifikan. Penurunan berat badan dalam penelitian ini kemungkinan juga dipengaruhi oleh perubahan komposisi makanan, pola aktivitas dan pola makan.

**Kata kunci :** Irama sirkadian, metabolisme sukrosa, metabolisme lemak, peningkatan berat badan, obesitas.

## ABSTRACT

### EXPERIMENTAL STUDY OF THE ADDITION OF 30% SUCROSE SOLUTION ON BODY WEIGHT OF MICE IN A CIRCADIAN RHYTHM DISRUPTION MODEL

**Background :** Obesity is a major health problem that is challenging for society because it can cause metabolic disorders in the body, such as diabetes, hypertension, coronary heart disease, and stroke. One of the risks that can cause obesity is consuming food with excessive amounts of energy without physical activity. Excessive food consumption due to increased appetite can be influenced by sleep patterns which are related to circadian rhythm. Circadian rhythm is a natural pattern of the human body that repeats itself every 24 hours and influences many processes in the body, such as sleep patterns, wakefulness, hormone production, and physical performance. An imbalance between circadian rhythms and changes in eating behavior patterns can cause a mismatch between the central system and the peripheral rhythm of the circadian rhythm, which can result in dysfunction of various physiological processes in the body, such as disruption of glucose homeostasis and fat metabolism, both of which are associated with increased body weight. The habit of consuming large amounts of sucrose with disturbed sleep patterns also has a risk of increasing body weight.

**Objective :** To determine the effect of circadian rhythm disruption and consumption of 30% sucrose solution on changes in body weight in *Mus musculus* mice models.

**Methods :** The experimental study was carried out for 14 days with 20 *Mus musculus* mice as subjects. Mice were divided into four groups NLD-Aquades, ILD-Aquades, NLD-Sucrose, and ILD-Sucrose. Sucrose was given in the form of a 30% sucrose solution as additional intake, circadian rhythm disruption was provided by reversing the lighting pattern of the mice. Changes in body weight were measured at the beginning and at the end of the study. Data analysis used *One-Way ANOVA* and *Repeated Measured ANOVA* with the *Shapiro-Wilk Test* for normality.

**Results :** There was no difference in the average body weight of mice between groups at  $H_0$  ( $P > 0,05$ ), but at  $H_{14}$  there was a significant difference in the average body weight of mice between groups ( $P < 0,05$ ), namely between the NA-NS group, IA-NS group, and IA-IS group. Mice in the NS group experienced a significant decrease in body weight during intervention ( $P < 0,05$ ), while mice in the NA, IA, and IS groups did not experience a significant change in body weight during intervention ( $P > 0,05$ ).

**Conclusion :** The effect of consumption of 30% sucrose solution and circadian rhythm disruption on body weight in this study is different from previous studies which showed a significant increase in body weight. Weight loss in this study may also have been influenced by changes in food composition, activity patterns, and eating patterns.

**Keywords :** Circadian rhythm, sucrose metabolism, fat metabolism, weight gain, obesity.