Early Sleep Midpoints Show Decreased Discretionary to Total Calorie Ratios; Increased Fruit, Water, and Fiber Intake In Young Adult Cohort

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Abstract

Previous research suggests a link between poor sleep quality and increased consumption of energy dense foods. However, little is known about the timing of sleep and whether or not it affects dietary intake. The purpose of this study was to determine if early, middle, or late sleep midpoints were associated with healthier diets among students participating in the ongoing College Health and Nutrition Assessment Survey at the University of New Hampshire between 2012-2014 (n=1,302; 66% female; mean age 18.9). Sleep behaviors were collected from an online questionnaire and dietary intake was assessed using three-day food records and nutrient analysis software (Diet Analysis Plus). Sleep midpoints were calculated from self-reported bed times and rise times on usual weekdays and subsequently divided into tertiles. On average, students reported 8.14 hours of sleep and a sleep midpoint time of 3:54 am. As compared to those in the latest sleep midpoint tertile, students in the earliest tertile had higher intake of fruit (15.5±4.0 vs. 12.7±3.4 cups; p=0.03), fiber (23.1±4.9 vs. 19.7±3.2 grams; p=0.05), total water (1960±148 vs. 1804±134 liters; p=0.05), and a lower ratio of discretionary calories to total calories (28.9±5 vs. 30.8±5%; p=0.05). No differences were seen in fat or carbohydrate intake between tertiles. Findings from this project suggest college students with earlier sleep midpoints consume healthier diets, including more fruit and less discretionary calories.

Methods

Participants

Between 2012-2014, undergraduate students ages 18-24 completed a 65-item online Wellness Questionnaire as part of the ongoing College Health and Nutrition Assessment Survey (CHANAS). Students were recruited from an introductory nutrition course and provided written consent (UNH IRB #5524).

Data Management & Analysis

Self-reported sleep and wake times on usual weekdays were reported by 1,302 subjects (69.6% female) and were used to calculate total sleep and midpoint sleep time (total sleep hours/2 + sleep onset time). Subjects were divided into tertiles (early, middle, late) based on their midpoint sleep time and data was analyzed using univariate analysis of variance (SPSS V. 22). Covariates include sex, age, and BMI. Data are presented as means ±SE (p <.05).

Introduction

Only 25% of young adults report eating the recommended daily serving of fruits and vegetables in their diets. Increased consumption of discretionary calories has also become a staple of the daily food regimen. Evidence suggests this coincides with poor sleep behaviors among older adolescents as they emerge into independence. Previous research shows an association between good sleep habits and healthier diets and lifestyles in young adults. To date, most studies have focused on quality and duration rather than the timing of their sleep patterns. New theories between sleep and diet may be discovered by investigating the relationship between dietary intake and midpoint sleep time.

Purpose

To further examine the relationship between young adult dietary choices and midpoint sleep time.

To test the hypothesis that college students with an early sleep midpoint consume healthier diets including more fruit and vegetables compared to those with a late sleep midpoint time.

Subject Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Early n=462</th>
<th>Middle n=444</th>
<th>Late n=460</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male/Female (%)</td>
<td>24/76</td>
<td>25/75</td>
<td>24/76</td>
</tr>
<tr>
<td>Age (years)</td>
<td>18.9 ± 1</td>
<td>18.7 ± 1</td>
<td>18.7 ± 1</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>23.0</td>
<td>23.1</td>
<td>23.4</td>
</tr>
<tr>
<td>Hours Slept</td>
<td>8.1 ± 1</td>
<td>7.9 ± 1</td>
<td>8.3 ± 1*</td>
</tr>
</tbody>
</table>

*vs. Early vs. Middle

Midnight Sleep Time

Key Findings

- Students reported an average 8.14 hours of sleep and had a sleep midpoint time of 3:54 am.
- Compared to those with a late sleep midpoint, students with an early sleep midpoint consumed more:
  - Fruit (1.5±1 vs. 1.3±1 cups, p<.05)
  - Fiber (23.1±4 vs. 19.7±4 grams, p<.05)
  - Total Water (2.1±1 vs. 1.8±1 L, p<.05)
- Students with an early sleep midpoint had a lower ratio of discretionary to total calories as compared to those with a late sleep midpoint (28.9±5 vs. 30.8±5%, p<.05).
- No differences in fat, carbohydrate, or vegetable intake were observed between groups.

Dietary Intake

Subjects' self-reported 3-day food records were analyzed via Diet Analysis +10.0.

Discretionary Calories

Discretionary calories are defined as calories which provide no nutritional value and often come from added sugars, high-fat foods or alcohol. The ratio of discretionary to total calories represents the proportion of calories in the diet that are derived from poor nutritional sources.

Implications

- Students with earlier sleep midpoints consume healthier diets, including more fruit and less discretionary calories.
- More research is needed to determine a causal relationship.

References


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