The relationship between caffeine intake, lifestyle factors, sleep quality and perceived stress in college students

ABSTRACT

The purpose of this cross-sectional study was to examine the relationship between caffeine intake and lifestyle factors of college students, including sleep quality and perceived stress. College students (n=118) were recruited via a university email list. Participants completed validated questionnaires about food intake, perceived stress, and sleep quality. In addition, first morning urine and fasting blood samples were collected during a clinic visit. To assess relationships between caffeine intake and lifestyle factors, Pearson’s correlations and linear regression models were used. Median age of participants was 24 and 71.2% were female. Caffeine intake ranged from 0.12 to 595.5 mg/day, with mean intake of 104.2 mg/day. Caffeine intake was significantly associated with sleep index score. We further compared sleep quality index scores, and perceived stress scores across tertiles of caffeine intake. We found that mean sleep quality index score was greater significantly in the highest tertile of caffeine intake. To investigate lifestyle factors associated with perceived stress a multiple linear regression model was built and we found that significant predictors of perceived stress were sleep quality index, sex, and age.

INTRODUCTION

1. Caffeine is the most widely used drug in the world.1
2. Generally considered safe, but safety in college age individuals has not been fully examined.2
3. Caffeine is consumed in the form of coffee, tea, and fortified food and beverages.3
4. College students are a large group user of caffeine, and a primary target for caffeine-containing products.4,5
5. College students use caffeine to reduce stress and compensate for insufficient sleep.6
6. During times of academic stress, sleep quality and quantity decline, while caffeine intake increases.7
7. The stimulant properties of caffeine may mimic the stress response.8
8. As such the relationship between caffeine intake and stress in college students warrants investigation.

METHODS

1. Cross-sectional study at a Southeastern university
2. Inclusion Criteria
   - Over the age of 18
   - BMI 17.40 kg/m²
   - Not pregnant or breastfeeding
   - Generally healthy
   - Absence of regular anti-inflammatory medications
   - The National Cancer Institute’s Diet History Questionnaire II allowed for calculation of HEI 9.10
3. PSS and PSQI were treated as the dependent variables
4. Caffeine intake, age, fatigue, cortisol, work status, alcohol intake, exercise, body fat%, HEI, sex, glycerol load were independent variables
5. The Pittsburgh Sleep Quality Index (PSQI)11
   - Scores range from 0-21 points
   - A higher score indicates poorer sleep quality
   - PSQI > 5 indicates poor sleep quality
6. The Perceived Stress Scale (PSS)12
   - Scoring by sum of responses
   - 0-13 considered low stress
   - 14-26 moderate stress
   - 27-40 high perceived stress.
7. Study Population
   - 182 screened, 143 enrolled, 118 completed
   - Mostly white (66.9%), non-Hispanic (86.4%), single (71.2%)
   - Mean age of 24 years
8. Figure 1. Radar Plot for Median HEI Score

RESULTS

1. Selected lifestyle, biological, and dietary intake factors form the population are discussed below.
2. Mean HEI for the sample group was 65.9.
3. Figure 1 provides the HEI score breakdown for the 13 components.
4. Averaged 270 minutes of exercise weekly
5. Work Status by hours per week
   - 45.8% worked <35 hours
   - 29.7% worked >35 hours
   - 24.6% did not work.
6. PSQI - median 6
   - PSS - median 14
   - Body fat% - mean 23.7% of total body weight
   - Caffeine intake - median 25 mg/day
7. Caffeine Intake and correlation with PSS & PSQI is documented
8. Caffeine intake compared to PSS
   - Higher intake group had significantly higher PSQI.
   - Every 100 mg increase in caffeine intake increased PSQI by 0.5.
   - Not surprising given the stimulant nature of caffeine and consistent with previously published findings.9,10
9. Caffeine intake compared to PSS
   - Low and high caffeine users reported higher PSS than moderate users.
   - Moderate caffeine intake, may be associated with lower perceived stress.

Healthy Eating Index

- Higher than previously reported measures of college students and the national average.11,12
- The only factor associated with improved sleep quality
- Poor sleep quality has been reported to negatively impacted diet quality.13
- Echoing Godos et al., that further research with improved and consistent study design is needed to confirm the relationship between diet quality and sleep quality.14

DISCUSSION

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Conclusions

The results from this study demonstrate the complex and confounding effects of lifestyle factors on aspects such as sleep quality and perceived stress. Our hypothesis that, perceived stress would be associated with higher caffeine intake was substantiated. Additional results indicated a relationship between sleep quality and stress. Given that the only modifiable risk factor for stress, was sleep quality, addressing sleep quality may have a reasonable approach to reducing stress. Further research is needed to determine the cause and effect relationships between lifestyle factors, stress and sleep quality in college students.