女性アスリートの食事が睡眠の質に及ぼす影響

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【目的】
　本研究は、女性アスリートの食事が睡眠の質に及ぼす影響を検討することを目的とした。

【方法】
　被験者は、同意を得たスポーツ系大学に所属する持久系スポーツをおこなう女性アスリート（24 名）であり、食事調査と、主観的睡眠調査および客観的睡眠測定を行った。食事調査は、食事記録表を用いて栄養計算ソフト（エクセル栄養君 Ver. 9.0）で分析した。また摂取エネルギーに対する各種栄養素の占める割合を算出した。主観的睡眠調査は、PSQI-J と JESS を行った。客観的睡眠調査は、ウェアラブル端末（Fitbit charge3）を用いた。食事摂取と客観的睡眠調査は、練習日 6 日間と休養日 1 日の計 7 日間実施した。統計解析には、EZR を用いた。食事調査と睡眠の質の相関関係の分析には、Spearman の順位相関係数 ρ を求め $\rho \geq 0.30$ を統計学的有意差ありと判定した。練習日と休養日の食事と睡眠の比較には、対応のある T 検定を用いた。相関係数以外の有意水準は 5%未満とした。

【結果】
　1000 kcal あたりの摂取栄養素と睡眠の質の影響については、三大栄養素と深い睡眠時間との間に関連がみられ、1 日および夕食の炭水化物摂取量とたんぱく質の摂取量も有意な正の相関が確認された。一方、1 日の脂質の摂取量と深い睡眠には有意な負の相関がみられた。また夕食を食べてから就床までの時間が長いほど、全ての睡眠項目が短くなり有意な負の相関が認められた。

【結論】
　持久系スポーツの女性アスリートは、1 日および夕食における 1000 kcal あたりの炭水化物摂取量が多いほど、深い睡眠時間が長くなることが確認された。女性アスリートの食事は睡眠の質に影響を及ぼすことが示唆された。

Effects of diet on sleep quality in female athletes

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[Objective]
   This study investigated the effect of diet on sleep quality in female athletes.

[Methods]
   With the consent of the participants, we surveyed the diet, subjective sleep quality, and objective sleep quality of 24 female sport university students participating as athletes in endurance sports. Data from the dietary survey obtained from a dietary record sheet was then analyzed using nutrition calculation software (Excel Eiyo-Kun Ver. 9.0). We also calculated the proportion of various nutrients in energy intake. Furthermore, while a subjective sleep survey was conducted using the Japanese version of the Pittsburgh Sleep Quality Index and the Japanese version of the Epworth Sleepiness Scale, the objective sleep survey was conducted using a wearable device (1 > Fitbit Charge 3 < 1). The dietary intake and objective sleep survey periods were seven days (six training days and one rest day). Subsequently, statistical analysis was conducted with EZR, after which the correlation between diet and sleep quality was examined using the Spearman rank correlation coefficient test. A P-value $\geqq$ 0.30 was considered statistically significant.   To compare diet and sleep quality differences between the training days and the rest day, we also conducted a paired t-test. The significance level other than the correlation coefficient was set at < 5%.

[Results]
   Based on the effects of nutrient intake and sleep quality per 1000 kcal, intake of the three main types of nutrients was associated with deep sleep duration. Furthermore, results showed that carbohydrate and protein intake per day and at dinner were significantly and positively correlated with deep sleep duration. In contrast, daily lipid intake was significantly and negatively associated with deep sleep. Moreover, a longer interval between dinner and bedtime was associated with poor outcomes for all sleep items, showing a significant negative correlation between such a long interval and quality of sleep.

[Conclusion]
   Therefore, these results confirmed that a higher sugar intake per 1000 kcal per day and at dinner was associated with deep sleep duration in female endurance athletes, which suggested that diet in female athletes affected their sleep quality.