

### The association of sleep quality and insomnia with dietary intake of tryptophan and niacin

J. Verster<sup>1</sup>, A. Fernstrand<sup>1</sup>, D. Bury<sup>1</sup>, T. Roth<sup>2</sup>, J. Garssen<sup>1</sup>

<sup>1</sup> Division of Pharmacology, Utrecht University, The Netherlands

<sup>2</sup> Sleep Disorders and Research Center, Henry Ford Health System, USA

**Introduction:** Dietary intake of tryptophan and niacin have been related to sleep. However, the sleep-promoting effects of these nutrients are still under investigation. The aim of the current study was to examine the relationship between daily dietary intake of tryptophan and niacin and sleep.

**Materials and methods:** A survey on past week's dietary intake (food frequency questionnaire) was completed by N = 509 Dutch university students (20.8 years old). The SLEEP-50 questionnaire subscale on insomnia was completed, and sleep quality (0–10 score) and total sleep time (TST) were also assessed. Daily intake of tryptophan and niacin was correlated to insomnia rating, sleep quality and TST using nonparametric (Spearman) correlations. Analyses were conducted for the group as a whole, and for men (N = 143) and women (N = 366) separately.

**Results:** Mean [SD] scores of insomnia (14.6 [4.3]), sleep quality (7.3 [1.2]), TST (7.7 h [0.9]), and daily dietary intake of tryptophan (0.618 g [0.3]) and niacin (15.88 mg [6.7]) were within normal ranges. Insomnia scores correlated significantly with dietary intake of tryptophan ( $r = -0.180$ ,  $p = 0.0001$ ) and niacin ( $r = -0.157$ ,  $p = 0.001$ ). When controlling for total caloric intake, the partial correlation between tryptophan intake and insomnia remained significant ( $r = -0.105$ ,  $p = 0.029$ ). Niacin intake also correlated significantly with sleep quality ( $r = .094$ ,  $p = 0.045$ ). No significant correlation was found with TST. In men, insomnia scores correlated significantly with dietary intake of tryptophan ( $r = -0.287$ ,  $p = 0.002$ ) or niacin ( $r = -0.243$ ,  $p = 0.008$ ). Sleep quality scores also correlated significantly with dietary intake of tryptophan ( $r = 0.205$ ,  $p = 0.026$ ) and niacin ( $r = -0.240$ ,  $p = 0.008$ ). In women, none of the correlations were significant.

**Conclusion:** A modest but significant association was found between dietary intake of tryptophan and niacin and insomnia and sleep quality. The nature and causes of the observed gender differences require further investigation.

**Acknowledgements:** This study was funded by Utrecht University.

<http://dx.doi.org/10.1016/j.sleep.2015.02.1388>

### The association between insomnia and perceived health status

A. Donners<sup>1</sup>, D. Bury<sup>1</sup>, A. Fernstrand<sup>1</sup>, J. Garssen<sup>1</sup>, T. Roth<sup>2</sup>,

J. Verster<sup>1</sup>

<sup>1</sup> Division of Pharmacology, Utrecht University, The Netherlands

<sup>2</sup> Sleep Disorders and Research Center, Henry Ford Hospital, USA

**Introduction:** Impaired sleep can have a significant impact on perceived health status. The aim of the current study was to examine the relationship between perceived health status and sleep quality, total sleep time, and insomnia.

**Materials and methods:** A survey was conducted among Dutch university students. General health and perceived immune status were scored on a scale ranging from 0 (very poor) to 10 (excellent). Sleep parameters were collected with the insomnia subscale of the SLEEP-50 questionnaire. Total sleep time (TST) was recorded, and sleep quality was scored on a scale ranging from 0 (very poor) to 10 (excellent). Non-parametric correlations (Spearman) were used to examine the association between perceived health and immune status and the sleep parameters.

**Results:** N = 509 subjects completed the survey (N = 143 men, and N = 366 women). They were on average 20.8 (2.6) years old and reported a TST of 7.7 (0.9) hours. Mean (SD) scores were 14.6 (4.3) for insomnia, 7.3 (1.2) for sleep quality, 7.7 (1.0) for general health, and 7.8 (1.3) for perceived immune status. Perceived general health correlated significantly with scores for insomnia ( $r = -0.228$ ,  $p = 0.0001$ ) and sleep quality ( $r = 0.235$ ,  $p = 0.0001$ ), but not with TST ( $r = 0.058$ ,  $p = 0.196$ ). Similarly, perceived immune status correlated significantly with scores for insomnia ( $r = -0.193$ ,  $p = 0.0001$ ) and sleep quality ( $r = 0.234$ ,  $p = 0.0001$ ), but not with TST ( $r = 0.051$ ,  $p = 0.254$ ). A significant correlation was found between perceived health status and immune functioning ( $r = 0.704$ ,  $p = 0.0001$ ). Insomnia scores were highly correlated to sleep quality ( $r = -0.697$ ,  $p = 0.0001$ ) and to a lesser extent with TST ( $r = -0.218$ ,  $p = 0.0001$ ). Overall, the observed associations were stronger in men when compared with women.

**Conclusion:** Whereas insomnia and sleep quality were significantly related to perceived general health and immune status, this relationship was not found for total sleep time.

**Acknowledgements:** This study was funded by Utrecht University.

<http://dx.doi.org/10.1016/j.sleep.2015.02.1389>

### Discussion on the TCM psychological mechanism of insomnia

C. Wang, G. Li, F. Wang, W. Wang, F. Feng, J. Zhang, X. Liu, X. Zhou  
Psychology and Sleep Department of Guang'anmen Hospital of China Academy of Chinese Medical Sciences, China

**Introduction:** Insomnia, defined as both physical and mental disease, can be completely curable via psychological treatment. On the basis of TCM psychology, discussion and interpretation on mechanism and treatment of insomnia are aimed to be approached from the perspectives of primordial spirit, conscious spirit and desire spirit.

**Materials and methods:** The literature on TCM and the basic concepts of advanced TCM psychology are referred to. In TCM basic theories Yuan-shen means primordial spirit which represents the level of physical spirit, Yu-shen, or desire spirit, stands for people's needs and demands, Shi-shen, known as conscious spirit, indicates cognition and thinking. The original motivation of sleep lies in the physical demand of physiology, which is the demand of primordial spirit. Based on the physiological demands, the desire spirit will produce a sleepy feeling known as drowsiness. Conscious spirit expresses the cognition about concrete sleeping movement and sleep rhythm during the experience of sleep over and over again.

**Results:** The process of the normal sleep goes as the following pathway: primordial spirit → desire spirit → conscious spirit → sleep action, during which primordial spirit is the primary and fundamental factor. The key mechanism of insomnia is that self-consciousness's control on sleep takes place of the original motivation of physical demand; in other words, "conscious spirit" replaces "primordial spirit", controlling the body completely. The basic psychotherapy principle is regaining physical demand which means to reset the primordial spirit's control status. In detail, integrated treatment is that patients are encouraged to ease their eagerness for sleep and their fear of insomnia under low resistance via thought induction psychotherapy (TIP).

**Conclusion:** The basic theories of traditional Chinese medicine contain profound psychological thoughts. Further study on the basic theories can help us to put forward unique opinion on sleep and pathological mechanism of insomnia, which would advance clinical practice greatly.

**Acknowledgements:** Thanks for the support of Key Projects in the National Science & Technology Pillar Program during the Eleventh Five-Year Plan Period (2009BAI77B09), National Natural Science Foun-