The Association of Sleep Duration, Sleep Quality and Liver Function in Taiwan

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Abstract: Office workers often work overtime, stay up late, lack of sleep, and have poor sleep quality, resulting in a high liver index. Abnormal liver function is the main risk factor for modern social civilization diseases and chronic diseases. The purpose of this study was to explore the relationship between sleep time, sleep quality, and liver function, and analyze the collected data from the Taiwan MJ Health Examination Center from 2001 to 2010. This study mainly found that participants with extremely poor sleep had 1.128 times the chance of developing abnormal liver function compared with participants with good sleep. At the same time, it was found that the average daily sleep time of fewer than 4 hours, compared with people who sleep for 7-8 hours, the probability of abnormal liver function is 1.206 times. Therefore, good sleep quality and proper sleep time will reduce the occurrence of abnormal liver function.

INTRODUCTION

Modern office workers often work overtime and lack sleep, which leads to excessive liver load and high liver index. However, many people choose to ignore health warnings. It was not until repeated cases of karoshi (death from too much work) that some people began to pay attention to the health warnings of abnormal liver function [1]. Zheng (2010) further analyzed the liver health examination data of nearly 15,000 young and middle-aged (30-50 years old) corporate employees in 2010, and the top three abnormal liver examinations were fatty liver (45.36%), abnormal GPT (18.74%), Hepatitis B with original (11.53%) [1]. Recent studies have shown that sleep duration and quality related to liver function (including abnormal coagulation factor synthesis, hormone metabolism disorders, and fat metabolism) contribute to fatty liver and cardiovascular disease, but sleep duration is associated with the fatty liver risk to a large extent are inconsistent [2-4]. Usually,
sleep duration is closely associated with obesity, diabetes, hypertension, cardiovascular disease, Nonalcoholic Fatty Liver Disease (NAFLD), and detrimental serum lipid levels [5]. Recently, Kim et al. (2013) noted a significant association between increased risk of NAFLD and short sleep duration or poor sleep quality in middle-aged Koreans. Kim et al. found that women with shorter sleep duration were more likely to develop NAFLD [6]. Although men with alcoholic fatty liver disease were not excluded from the analysis, short sleep duration was strongly associated with fatty liver disease in Japanese men [7].

Poor sleep is not directly related to poor liver function, and there is no need to worry too much about liver function damage if you don’t sleep well; however, even if the liver function index is only slightly increased after the blood draw, it should not be ignored. However, there are many reasons for the sudden deterioration of liver function. Lack of sleep is only one of them. The liver must be fully rested during sleep so that its function can return to normal. When the human body is awake, the liver will continue to require metabolism to maintain its function. Once overloaded, it will suddenly dysfunctional. Long-term unimproved will cause harm, the most serious may lead to lesions [1].

Humans fall asleep for up to one-third of their lives, but the function of sleep remains a subject of intense debate [8]. Poor sleep quality and insufficient sleep are common problems in modern society. Good sleep is necessary for good health and quality of life. Sleep is important for maintaining homeostasis in the body, and sleep patterns change as society develops, which can affect the quality of life. The length of sleep is not only an indicator for predicting sleep quality but also an important parameter for predicting quality of life, health status, and longevity. For adults, 7-8 hours of sleep per night is recommended as the optimal amount of sleep [9]. Sleep is a key determinant of metabolic homeostasis, and sleep loss or disruption of sleep-wake patterns are associated with impaired metabolism [10]. Sleep problems are common civilization diseases and health problems in modern society. The importance of sleep to health has always been an important topic. However, research on the association between sleep duration and sleep quality, and liver function is very limited. Using “sleep quality” and “abnormal liver function” as keywords to search the literature in PubMed, most of the studies focused on “sleep apnea” and “non-alcoholic fatty liver disease”. Therefore, this study conducted a long-term database analysis to investigate the association between sleep duration and sleep quality, and liver function.

METHODS

This is a cross-sectional study that analyzed data from MJ Health Examination Center from 2001 to 2010. The subjects were 680,539 in number (339,925 males and 340,614 females), whose ages ranged from 20 to 65 years old. All subjects completed structured questionnaires that included demographic information, age, gender, self-reports, and responses to sleep quality and quantity, marital status, education, smoking, alcohol consumption, and current medical status (hypertension, diabetes, cerebrovascular disease, heart disease). All subjects underwent a series of blood, urine, body measurements, functional tests, physical examination, and medical history. Screening procedures of the same instrument model are used in all check-up centers, and results are centrally managed and stored. All subjects received liver function tests (GOT, GPT, ALP, rGT, bilirubin, Albumin, Prothrombin Time), and the data were coded as “Yes” and “No” to choose one of two to diagnose whether the liver function was abnormal.

Sleep time is divided into five categories: 0-4 hours, 4-6 hours, 6-7 hours, 7-8 hours, and more than 8 hours. Sleep quality was assessed by the Pittsburgh Sleep Quality Index (PSQI). In which sleep quality was self-assessed by questionnaires and divided into the following three categories:

1. Very good sleep (1-3 points)
2. Slightly poor sleep (less than 5 points)
3. Very poor sleep (above 5)

Socio-demographic background variables included gender, marital status, education level, and bad habits including smoking and drinking. Smoking status was never smoking, past smoking, and currently smoking. The drinking status includes never drinking, drinking in the past, and currently drinking, and whether the individual currently has chronic diseases, including hypertension, diabetes, cerebrovascular disease, and heart disease. In this study, SPSS IBM 20.0 was used for descriptive statistics, and multiple logistic regression was used to predict the correlation between variables, and to examine the correlation between sleep time, sleep quality, and liver function.

RESULT

Table 1 showed that overall males (49.9%) had slightly different percentages than females (50.1%). Men aged 20-39 had the most (49.5%), followed by those aged 40-59 (39.7%) and the least (10.7%) aged over 60 years. Women aged 20-39 had the most (50.3%), followed by those aged