

The Temperament and Character Pattern of Korean Narcolepsy Patients

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■ ABSTRACT

Objectives: To compare the biogenetic temperament and character patterns of subjects with narcolepsy and those of healthy control subjects.

Methods: Twenty-two subjects with narcolepsy, diagnosed with the International Classification of Sleep Disorder (ICSD) criteria, and 22 healthy control subjects were recruited. The Korean version of the Temperament and Character Inventory was administered to all subjects.

Results: Compared to healthy control subjects, subjects with narcolepsy showed significantly higher Novelty-Seeking (ANCOVA, $F=5.42$, $p=0.025$), lower Persistence ($F=8.41$, $p=0.006$) and lower Self-Directedness scores ($F=4.70$, $p=0.036$).

Conclusion: Narcoleptic patients have a distinct pattern of biogenetic temperament and character. Our findings suggest that narcoleptic patients are exploratory in response to novelty but give up easily. In addition, our findings show that narcoleptic patients consider themselves ineffective, purposeless, and fragile. *Sleep Medicine and Psychophysiology* 2005 ; 12(1) : 45-49

Key words: Temperament · Character · Narcolepsy.

INTRODUCTION

Narcolepsy is a sleep disorder characterized by excessive daytime sleepiness and other REM sleep phenomenon such as cataplexy, sleep paralysis and hypnagogic hallucination (1). Narcolepsy is not a rare condition. Its prevalence was

reported to be 0.16% in Japan (2), 0.047 % in Europe (3), and 0.05–0.07% in U.S.A. (4,5).

Multiple factors, such as genetic, immunologic and molecular factors have been suggested to be involved in the development of narcolepsy (6). A genetic factor strongly associated with narcolepsy has been reported : individuals with the human leukocyte antigen (HLA) class II haplotype DRB1*1501 or DQB1*0602 have been reported to be predisposed to narcolepsy (7-9). Recent studies have revealed that orexin/hypocretin deficiency plays an important role in narcolepsy. The low orexin/hypocretin level in CSF has become major diagnostic evidence in the evaluation of narcolepsy (10-11).

The psychiatric characteristics of narcolepsy patients have been reported : anxiety, social introversion (12), negative cognitive self-evaluation due to overall psychosocial adjustment difficulties (13-16), and difficulties at work, or in marriage or social life (12-16). A considerable proportion of narcoleptic patients suffered from depression (1). It is not clear, however, whether these characteristics are the consequences of narcolepsy symptoms or the inborn characteristics of patients with narcolepsy.

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The biogenetic characteristics of narcolepsy patients are not known, so we aimed at studying them using the Temperament and Character Inventory (TCI) developed by Cloninger et al (17). TCI contains four temperament dimensions that are independently heritable and manifest themselves early in life, and three character dimensions that mature in adulthood. We hypothesized that individuals with narcolepsy have a biogenetic temperament and character distinct from healthy control subjects.

MATERIALS AND METHODS

1. Subjects

Twenty-two patients with narcolepsy and twenty-two healthy control subjects were recruited. The clinical and demographic characteristics of the subjects are summarized in Table 1.

The subjects were between 13 to 58 years old and diagnosed as narcolepsy based on the International Classification of Sleep Disorder (1). All subjects with narcolepsy were outpatients referred by the Sleep Disorders Clinic, Seoul National University Hospital in Seoul, Republic of Korea. After giving them a complete description of the study, written informed consent was obtained from all participants or their guardians.

2. Assessment and measures

All patients were interviewed by a board-certified sleep specialist (D.U.J.). Nocturnal polysomnography, multiple sleep latency test, and the Temperament and Character Inventory were administered to all subjects.

1) Clinical interview

In the initial clinical interview, the presence of excessive

Table 1. Clinical and demographic characteristics of narcolepsy subjects and control subjects

| | Narcolepsy (N=22) | Control (N=22) | T | df | p |
|--------------------------|----------------------|-------------------|-------|----|------|
| Age (yrs) (mean ± SD) | 26.2 ± 12.7 | 27.2 ± 12.3 | -0.27 | 42 | 0.79 |
| Sex (male) | 14 (63.6%) | 14 (63.6%) | | | |
| Presence of EDS | 22 (100%) | | | | |
| Presence of cataplexy | 18 (81.8%) | | | | |
| Presence of SOREMP* | 22 (100%) | | | | |

* : A case with 2 or more SOREMP on 5 scheduled naps of multiple sleep latency test was considered as having SOREMP. EDS : excessive daytime sleepiness, SOREMP : sleep-onset rapid eye movement period

daytime sleepiness, cataplexy, hypnagogic hallucination, sleep paralysis, and fragmented nocturnal sleep were assessed.

2) Nocturnal polysomnography

Polysomnographic recordings were performed with Grass model 78 polysomnograph. Electroencephalography (EEG), left and right electro-oculography (EOG), submentalis electromyography (EMG), left and right anterior tibialis EMG, electrocardiography (ECG), snoring microphone, oro-nasal airflow, chest and abdominal respiratory movements, and arterial oxygen saturation were evaluated. Sleep records were scored manually on the 30-second epochs using Rechtschaffen and Kales criteria (18).

3) Multiple sleep latency test

The multiple sleep latency test was conducted on subjects with narcolepsy. It consisted of five scheduled naps at 9 : 00 AM, 11 : 00 AM, 13 : 00 PM, 15 : 00 PM, and 17 : 00 PM while the subject was monitored by polysomnography. Sleep latency between the light-out time and the sleep onset was calculated in each nap. After a 20-minute monitoring period, patients stayed awake until the following scheduled nap. REM sleep that occurs within 15 min of sleep onset was defined as a sleep-onset REM period (SOREMP).

4) Temperament and Character Inventory (TCI)

Subjects filled out the Temperament and Character Inventory (TCI) developed by Cloninger et al (17). TCI is a questionnaire consisting of 240 questions developed to assess the four biogenetically determined dimensions of temperament (Novelty Seeking, Harm Avoidance, Reward Dependence, and Persistence) and the three environmentally determined dimensions of character (Self-Directedness, Cooperativeness, and Self-Transcendence). For our patients, we used the Korean version of TCI (19).

2. Statistical analysis

To compare the age of narcoleptic patients and control subjects, the independent student t-test was used. To analyze the uncorrected difference of TCI variables between narcoleptic patients and healthy control subjects, the independent student t-test was used. One-way (diagnosis) analysis of covariance was used to analyze the difference in TCI subscales controlling for age. P-value less than 0.05 was considered statistically significant. All statistical analyses were performed using SPSS 10.0 (20).

Table 2. Comparison of the Temperament and Character Inventory (TCI) scores between narcolepsy subjects and control subjects

| | Narcolepsy mean (SD) | Control mean (SD) | F | df | <i>p</i> * |
|--------------------|----------------------|-------------------|------|---------|------------|
| Novelty Seeking | 20.05 (4.15) | 17.95 (6.11) | 5.42 | (1, 41) | 0.025 |
| Harm Avoidance | 20.59 (5.59) | 18.36 (7.02) | 1.18 | (1, 41) | 0.284 |
| Reward Dependence | 15.95 (2.66) | 16.77 (3.21) | 0.78 | (1, 41) | 0.383 |
| Persistence | 3.50 (1.44) | 4.95 (2.13) | 8.41 | (1, 41) | 0.006 |
| Self-Directedness | 19.68 (0.03) | 23.09 (8.95) | 4.70 | (1, 41) | 0.036 |
| Cooperativeness | 31.23 (4.84) | 30.59 (5.47) | 0.01 | (1, 41) | 0.923 |
| Self-Transcendence | 15.05 (7.27) | 14.91 (5.37) | 0.17 | (1, 41) | 0.683 |

* : One-way (diagnosis) analysis of covariance (age as a covariate)

RESULTS

The difference in the age of narcoleptic subjects and normal control subjects was not significant (Table 1).

Explorative t-tests revealed that the score of Persistence subscale of TCI for narcoleptic subjects was significantly lower than that for control subjects ($t = -2.66$, $df = 1,41$, $p = 0.01$). One-way (diagnosis) analysis of covariance (age as covariate) revealed that the Novelty Seeking score of narcoleptic subjects was significantly higher than that in control subjects ($F = 5.42$, $df = 1, 41$, $p = 0.025$), the Persistence score of narcoleptic subjects was significantly lower than that of the control subjects ($F = 8.41$, $df = 1, 41$, $p = 0.006$), and the Self-Directedness score of narcoleptic subjects was significantly lower than that of the control subjects ($F = 4.70$, $df = 1, 41$, $p = 0.036$) (Table 2).

DISCUSSION

Our findings show that the Novelty Seeking score of narcoleptic patients is higher than that of control subjects. A person with a high Novelty Seeking has been described as being exploratory, curious, impulsive and disorderly (21). Therefore, our finding suggests that narcoleptic patients may have frequent exploratory activity in response to novelty, impulsive decision making, extravagance in approach to cues of reward, quick loss of temper, and active avoidance of frustration. Low scorers on the Persistence scale are described as being inactive, indolent and underachieving (21). Lower Persistence in subjects with narcolepsy suggests that they are inactive, indolent, give up easily, but modest and pragmatic. In addition, narcoleptic patients scored lower on Self-Directedness than control subjects. This suggests that they have low self-esteem, blame others for their problems, and feel uncertain of their identity or purpose. They are often reactive,

dependent, and not resourceful (17). In short, our data suggest that narcoleptic patients are exploratory and curious in response to novelty but give up easily and thus may be ineffective, purposeless, and fragile.

The high Novelty Seeking score of narcoleptic patients is an interesting finding in terms of the pathophysiology of narcolepsy. In the prior version of TCI, Tridimensional Personality Questionnaire (TPQ), Cloninger divided the biogenetic temperament into three dimensions : Novelty Seeking, Harm Avoidance, and Reward Dependence (22). In addition, he suggested that Novelty Seeking, Harm Avoidance, and Reward Dependence were associated respectively with the dopaminergic, serotonergic, and norepinephrinergic system. According to the hypothesis, an individual who scores high on Novelty Seeking has low dopaminergic activity resulting in novelty seeking activity to increase his dopaminergic activity. From this point of view, the high score of narcoleptic patients on Novelty Seeking suggests their low dopaminergic activity.

Biochemical studies have shown the relationship between narcolepsy and dopaminergic system. Montplaisir et al (23). found that the level of dopamine and its metabolite homovanillic acid in CSF was low in narcoleptic patients. Additionally, a previous study has reported that the hypoactivity of dopamine system may be associated with cataplexy that is triggered emotionally by limbic projection (24). The loss of the orexin/hypocretin neurons, which project widely to the dopaminergic central nervous system, has been reported to be related to narcolepsy (25). It is also interesting that amphetamine-like drugs, such as methylphenidate and dextroamphetamine, are frequently used for the treatment of daytime sleepiness. These drugs elevate the extracellular dopamine concentration and reduce sleepiness. However, there are other studies which do not support the low dopaminergic activity in narcolepsy patients (26,27). Further research is required to elucidate the role of the hypodopaminergic activity in nar-

colepsy.

Our finding that narcoleptic patients scored low on Persistence is predictable to some degree. Low Persistence in narcoleptic patients suggests that they may give up easily and be inactive and lazy. Their temperament may further contribute to excessive daytime sleepiness and the habit of rarely finishing work and falling asleep in school or at work.

Low Persistence in narcoleptic patients may be related to their low Self-Directedness. A questionnaire survey (15) conducted in North America, Asia, and Europe involving 180 narcoleptic patients revealed that 51% believed the cause of their poor grade to be their symptoms and that 34% considered the symptoms as the cause of their interpersonal problem with teachers. Furthermore, 95% of working narcoleptics cited sleep attacks as the causality of their difficulties at work. Narcoleptic patients have difficulties in coping with people and in adapting themselves to social circumstances due to sleep attacks and cataplexy, which may be the cause of their low self-confidence and low self-esteem.

Our finding is, in part, consistent with previous reports. Hood and Bruck (13) conducted the Metamemory in Adulthood (MIA) questionnaire involving 33 narcoleptic patients. They reported that narcoleptic patients have lower self efficacy for memory performance than control subjects and the negative cognitive self evaluation as a consequence of overall psychosocial adjustment difficulty. Roy (14) conducted a psychiatric interview, an intelligence test and a personality questionnaire involving 20 narcoleptic patients and reported that twelve patients had current or past psychiatric disorder and ten patients had difficulties at work, in marriage or in social life. These results make us wonder whether the unique psychological characteristics of narcoleptic patients may be the consequences of excessive daytime sleepiness.

Other studies have compared narcoleptic patients and sleep apnea patients. These two sleep disorders share a common symptom, i.e., excessive daytime sleepiness. To demonstrate the differences in psychological characteristics between patients with sleep apnea and narcolepsy, Beutler et al. (12) conducted the MMPI involving 20 narcoleptic patients and 20 sleep apnea patients. They reported that the characteristics of narcoleptic patients tend to be anxiety and social introversion, whereas sleep apnea patients are readily characterized by hypochondriasis and hysteria. With this finding, we are not ready to conclude that the psychological characteristics of narcolepsy patients are the consequences of excessive

daytime sleepiness.

In this study, we report the distinct pattern of the biogenetic temperament of narcolepsy patients. Narcolepsy patients are exploratory and curious in response to novelty but they give up easily. Hence, they are ineffective, purposeless, and fragile. We propose that some of the features may be inborn and biogenetic and that they may influence the onset and the disease course of narcolepsy.

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조 록

한국인 기면병 환자의 기질 및 성격 유형

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연구목적 : 기면병 환자와 정상 대조군의 생물유전적 기질 및 성격을 비교하기 위한 연구를 시행하였다.

연구방법 : 국제 수면장애 분류에 따라 진단된 기면병 환자군 22명과 정상 대조군 22명을 대상으로 하였다. 각 군에게 한국어판 기질 및 성격 척도를 작성하도록 하고 그 결과를 비교하였다.

연구결과 : 정상 대조군에 비해 기면병 환자군은 유의하게 높은 새로운 것을 추구하는 경향(Novelty-Seeking) (ANCOVA, $F=5.42, p=0.025$), 낮은 완고한 경향(Persistence) ($F=8.41, p=0.006$), 그리고 낮은 자기중심성(Self-Directedness) ($F=4.70, p=0.036$)을 보였다.

결 론 : 기면병 환자들은 특유의 생물유전적 기질을 가지고 있다. 이 연구 결과는 기면병 환자들이 새로운 것에 대해 관심을 보이거나 쉽게 포기하는 기질을 가지고 있다는 것을 제시한다. 또한, 이 연구 결과는 기면병 환자들이 비효율적이며, 무력하며, 상처 받기 쉬운 자아상을 가진다는 것을 나타낸다.

중심 단어 : 기질 · 성격 · 기면병.