

Research Article

Prevalence of Chronic Pain among University Students in Japan

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Background: Although there are many reports related to psychological problems among university students, few are related to chronic pain. The aim of this study was to investigate the prevalence of chronic pain among university students and to clarify some of the factors that affect the occurrence of chronic pain.

Methods: Subjects were 584 university students and they anonymously answered a questionnaire related to pain, lifestyle and stress, and the Japanese version of the Maudsley Personality Inventory (MPI). We divided the subjects into two groups (chronic pain group, no chronic pain group). The results of the questionnaire and the MPI were compared between the two groups.

Results: The number of the subjects with chronic pain was 113 (19.3%). There was significant difference in the frequency of alcohol consumption between the two groups. Regarding the MPI, N score of the chronic pain group was significantly higher than that of the no chronic pain group.

Conclusions: Chronic pain was associated with the frequency of alcohol consumption. University students with chronic pain were more neurotic than those without chronic pain.

Keywords: Chronic pain; University student; Alcohol consumption; Lifestyles; Neuroticism; Extraversion-introversion; Personality characteristics; Maudsley Personality Inventory

Introduction

University students are a special group of the population with respect to health issues. Entering university involves a major change of environment and students are subjected to various stressors such as academic pressure, social issues and financial problems. Furthermore, their lifestyle is likely to become irregular. Although there are many reports related to health issues among university students [1], most focus on psychological problems such as depressive symptoms [2] and few are related to chronic pain. Chronic pain is a common condition that is associated with psychological problems. Zang et al [3] reported that chronic pain was closely related to self-reported academic pressure. Bohman et al [4] suggested that healthy lifestyle behavior (e.g., not smoking, not consuming alcohol, getting the recommended level of physical activity and consuming the recommended amounts of fruits and vegetables) had the potential to decrease the risk of developing chronic low back pain. Therefore, we hypothesized that many university students who have academic pressure and irregular lifestyles have chronic pain.

It is said that personality can influence an individual's perception of pain and mediate the evolution from acute to chronic pain [5]. We previously administered the Maudsley Personality Inventory (MPI) to outpatients attending all clinical departments of Mie University Hospital to clarify the relationship between pain and personality characteristics, and reported that patients with pain were introverted and neurotic [6]. Therefore, we hypothesized that there is a significant relationship between pain and personality characteristics among university students.

The aim of this study was to investigate the prevalence of chronic

pain among university students and to clarify some of the factors that affect the occurrence of chronic pain.

Materials and Methods

Mie University has faculties of engineering, medicine, bioresources, education, and humanities, law and economics, with a total of 6083 students (3693 men and 2390 women). We asked all students to participate in this study, and a total of 598 students (405 men and 193 women) voluntarily agreed to participate, including 366 engineering students, 156 medical students, 45 bioresources students, 19 education students, 12 humanities, law and economics students. 129 of the subjects were aged 18-19, 391 were aged 20-22, 70 were aged 23-25 and eight were aged over 26. We explained the aim and the methods of this study to all subjects, and informed consent was obtained from all. According to the ethical guidelines for epidemiologic studies from the Ministry of Health, Labour and Welfare, the age at which a person can provide informed consent is over 16 years old, and the study protocol was approved by the Mie University ethics board (No. 1406).

The subjects anonymously answered a questionnaire (Table 1) and the Japanese version of the MPI. The MPI was published by Eysenck [7] and Jensen [8] and was subsequently translated into Japanese [9]. The MPI is a self-rating questionnaire designed to measure the personality factors of extraversion-introversion and neuroticism, and includes a "lie scale" designed to measure lying. The MPI is composed of 80 questions in the three scales of extraversion-introversion (24 questions), neuroticism (24 questions), and lie (20 questions). The remaining 12 questions are not related to the three scales but are used as filler to help conceal the nature of the questionnaire from the

Table 1: Questionnaire.

Q1.	How tall are you? How much do you weigh?
Q2.	Have you experienced pain in your body over last 1 year? 1. Yes; 2. No
Q3.	How long have you suffered from pain? 1. Less than 1 month; 2. 1-3 months; 3. 3-6 months; 4. More than 6 months; 5. No pain
Q4.	Where is your pain located? (choose all that apply) 1. Head; 2. Teeth; 3. Neck; 4. Shoulder; 5. Arm; 6. Elbow; 7. Wrist; 8. Hand; 9. Chest; 10. Upper back; 11. Abdomen; 12. Lower back; 13. Buttock; 14. Hip; 15. Leg; 16. Knee; 17. Ankle; 18. Foot; 19. Other
Q5.	How many cigarettes do you smoke per day? 1. 0; 2. 1-9; 3. 10-19; 4. 20-29; 5. 30-39; 6. More than 40
Q6.	How often do you drink alcohol per week? 1. Never; 2. 1 day; 3. 2-3 days; 4. More than 4 days
Q7.	How long do you study per day? 1. Less than 1 hour; 2. 1-2 hours; 3. 2-3 hours; 4. 3-5 hours; 5. More than 5 hours
Q8.	How long are your baths? 1. Only showers; 2. Less than 5 minutes; 3. 5-30 minutes; 4. More than 30 minutes
Q9.	How many hours of sleep do you get per night? 1. Less than 4 hours; 2. 4-6 hours; 3. 6-8 hours; 4. 8-10 hours; 5. More than 10 hours
Q10.	Do you think that you feel more stress than other people? 1. Much more; 2. Somewhat more; 3. Less; 4. No stress at all

Table 2: Demographic data.

	Chronic pain group (n=113)	No chronic pain group (n=471)	p value
Height (cm)	166.6 ± 8.3	166.9 ± 11.6	0.795 ^a
Weight (kg)	59.1 ± 10.4	59.0 ± 10.6	0.936 ^a
Gender	n(%)	n(%)	0.910 ^b
Male	77 (68.1)	321 (68.2)	
Female	36 (31.9)	150 (31.8)	
Age	n(%)	n(%)	0.819 ^b
18 – 19	27 (23.9)	101 (21.4)	
20 – 22	73 (64.6)	306 (65.0)	
23 – 25	11 (9.7)	58 (12.3)	
26 <	2 (1.8)	6 (1.3)	
Faculty	n(%)	n(%)	0.978 ^b
Engineering	71 (19.8)	287 (80.2)	
Medicine	26 (17.2)	125 (82.8)	
Bioresources	10 (22.2)	35 (77.8)	
Education	4 (21.1)	15 (78.9)	
Humanities, law and economics	2 (18.2)	9 (81.8)	

^ap value was calculated using Student's *t* test.

^bp value was calculated using χ^2 test.

subjects. The MPI takes approximately 10 minutes to complete. The maximum score for extraversion-introversion (E score) is 48 points, and those for neuroticism (N score) and lie (L score) are 48 and 40 points, respectively. The higher the E score, the more extraverted the individual, the higher the N score, the more neurotic the individual, and the higher the L score, the higher the tendency to lie. We

previously conducted several studies using the MPI, focusing on the personalities of patients with pain [6], the personalities of patients with malignant tumors [10] and the psychological characteristics of mothers of patients with idiopathic scoliosis [11].

We excluded 14 students who did not complete the questionnaire, leaving 584 students (398 men, 186 women) for the final analyses.

Table 3: Results of questions 5 to 10.

	Chronic pain group (n=113)	No chronic pain group (n=471)	p value ^a
Q5. How many cigarettes do you smoke per day?			
	n (%)	n (%)	0.812
1. 0	107 (94.7)	441 (93.6)	
2. 1-9	3 (2.7)	17 (3.6)	
3. 10-19	3 (2.7)	8 (1.7)	
4. 20-29	0	4 (0.8)	
5. 39-39	0	0	
6. More than 40	0	1 (0.2)	
Q6. How often do you drink alcohol per week?			
	n (%)	n (%)	0.029
1. Never	49 (43.4)	266 (56.5)	
2. 1 day	45 (39.8)	147 (31.2)	
3. 2-3 days	14 (12.4)	51 (10.8)	
4. More than 4 days	5 (4.4)	7 (1.5)	
Q7. How long do you study per day?			
	n (%)	n (%)	0.882
1. Less than 1 hour	74 (65.5)	300 (63.7)	
2. 1-2 hours	26 (23.0)	104 (22.1)	
3. 2-3 hours	7 (6.2)	39 (8.3)	
4. 3-5 hours	5 (4.4)	19 (4.0)	
5. More than 5 hours	1 (0.9)	9 (1.9)	
Q8. How long are your baths?			
	n (%)	n (%)	0.171
1. Only showers	63 (55.8)	222 (47.1)	
2. Less than 5 minutes	7 (6.2)	19 (4.0)	
3. 5-30 minutes	36 (31.9)	182 (38.6)	
4. More than 30 minutes	7 (6.2)	48 (10.2)	
Q9. How many hours of sleep do you get per night?			
	n (%)	n (%)	0.684
1. Less than 4 hours	4 (3.5)	24 (5.1)	
2. 4-6 hours	63 (55.8)	229 (48.6)	
3. 6-8 hours	42 (37.2)	204 (43.3)	
4. 8-10 hours	4 (3.5)	13 (2.8)	
5. More than 10 hours	0	1 (0.2)	
Q10. Do you think that you feel more stress than other people?			
	n (%)	n (%)	0.101
1. Much more	25 (22.1)	66 (14.0)	
2. Somewhat more	47 (41.6)	194 (41.2)	
3. Less	38 (33.6)	184 (39.1)	
4. No stress at all	3 (2.7)	27 (5.7)	

^ap value was calculated using χ^2 test.

We defined chronic pain as pain felt within the preceding 1 year that lasted for more than 3 months, and we divided the subjects into two groups based on the presence (chronic pain group) or absence (no chronic pain group) of chronic pain. The results of questions 5 to 10

and the MPI were compared between the two groups. For statistical analysis, we used the Student's t test, χ^2 test and Mann-Whitney's U test. Values of $p < 0.05$ were considered statistically significant.

Results

The number of the subjects with chronic pain was 113 (19.3%); therefore, the chronic pain group consisted of 113 subjects and the no chronic pain group of 471 subjects. There were no significant differences in height, weight, gender or age between the two groups (Table 2). There was no significant difference among faculties in the prevalence of chronic pain (Table 2). The most frequent pain site in the chronic pain group was the lower back (31.0%), followed by the shoulder (19.5%), head (8.8%) and knee (8.0%).

In regard to questions 5 to 10, there was significant difference in alcohol consumption between the two groups with the chronic pain group having more frequent alcohol consumption than the no chronic pain group (Table 3). On the other hand, there were no significant differences between the two groups in smoking habit, daily study hours, bathing duration, sleeping hours or sensitivity to stress (Table 3). Table 4 shows the scores for each MPI item in the two groups. The mean N score of the chronic pain group was significantly higher than that of the no chronic pain group. There were no significant differences between the two groups in mean E and L scores.

Discussion

There are only a few reports related to chronic pain among university students. The prevalence of chronic pain among university students was estimated to be 32.5% (265 of 816 university students) by Klemenc-Ketis et al [12], 29.0% (467 of 1564 university students) by Brewer et al [13], and 24.9% (50 of 201 university students) by Thomas et al. [14] The present study showed that the prevalence of chronic pain among Mie University students was lower than that of these previous reports at 19.3%. The difference in the prevalence of chronic pain across countries could be attributed to a variety of biosocial and cultural factors. However, since the definition of chronic pain and the methods of research differed in these reports, the results must be interpreted with caution. This study showed that the most frequent pain sites in the chronic pain group were the lower back, shoulder, head and knee, and this result was consistent with the other previous studies [12-14]. In other words, there was no difference in the most frequent pain sites among countries. We expected the prevalence of chronic pain among medical students to be higher than that among the other faculties because it is well known that medical students experience high levels of stress and psychological problems [15]. However, we found no significant difference among faculties in the prevalence of chronic pain. In the general Japanese population, the prevalence of chronic pain was reported to be 15.4% by Nakamura et al [16], 12.4% by Nakamura et al [17] and 17.5% by Sakakibara et al. [18]. The prevalence of chronic pain among Japanese university students in the present study is considered similar to that of the general Japanese population.

University students are subjected to various stressors such as academic pressure, social issues and financial problems, and their lifestyle is likely to become irregular. In this study, we divided the subjects into a chronic pain group and a no chronic pain group, and investigated the relationship between chronic pain and the lifestyle factors of smoking habit, alcohol consumption, daily study hours, bathing duration and sleeping hours. We also investigated the relationship between chronic pain and sensitivity to stress. The result

Table 4: Results of the MPI.

	Chronic pain group (n=113)	No chronic pain group (n=471)	p value ^a
E score	23.9 ± 10.5	25.7 ± 11.0	0.111
N score	25.5 ± 10.3	22.8 ± 11.2	0.015
L score	11.4 ± 5.2	12.4 ± 5.6	0.112

^ap value was calculated using Mann-Whitney's U test.

showed that there was significant difference in alcohol consumption between the two groups with the chronic pain group having more frequent alcohol consumption than the no chronic pain group. Thomas et al. [14] reported that university students with chronic pain were much more likely to use alcohol to control pain than university students without chronic pain. Karunanayake et al [19] also reported that individuals with chronic pain were more likely to drink alcohol than those without chronic pain. On the other hand, Ekholm et al [20] reported that individuals suffering from chronic pain were less likely to drink alcohol than those without chronic pain because those individuals might not want alcohol-induced cognitive dysfunction. We could not clarify whether greater alcohol consumption caused chronic pain or whether alcohol was used to control pain.

Regarding smoking, study time, bathing, sleep and stress, there are some reports that these factors are significantly associated with chronic pain. Mitchell et al. [21] reported that women who were daily smokers had more chronic pain than women who were never smokers. Ganesan et al. [22] reported that the number of daily hours spent studying had a significant association with low back pain and that low back pain was precipitated by studying for over 5 hours per day on average. Lim et al. [23] reported that a warm whirlpool bath was beneficial for patients with chronic stroke-induced knee osteoarthritis. Keilani et al. [24] reported that various sleep problems were significantly associated with pain in patients suffering from chronic pain. White et al. [25] investigated the relationship between Perceived Stress Scale (PSS) scores and pain intensity, and reported that higher PSS scores were associated with greater pain intensity. However, we found no significant relationships between those factors and chronic pain in this study.

We utilized the MPI to investigate the relationship between personality and chronic pain, and found that the mean N score of the chronic pain group was significantly higher than that of the no chronic pain group, meaning that university students with chronic pain were more neurotic than those without chronic pain. We also previously reported that patients with chronic pain were neurotic [6]. Goubert et al. [26] reported that there was a significant relationship between pain severity and neuroticism. Wong et al. [27] reported that patients with more neurotic symptoms probably elicited more catastrophic thoughts about pain. Catastrophic thought is associated with great pain intensity [28]. Neuroticism refers to the tendency to experience negative emotional states [29]. There are some reports that negative emotion exacerbate and prolong pain [30]. As for the relationship between pain and extraversion-introversion, we previously reported that patients with chronic pain were introverted [6]. However, in this study, there was no significant difference in the mean E score between the chronic pain group and the no chronic pain group.

There are some limitations to this study. We did not investigate the subjects' year of university and there may be differences in

academic pressure or lifestyle between university freshmen and seniors. In addition, we did not investigate the amount of alcohol consumption or the temperature of water for bathing. We did not use a questionnaire that could assess perceived stress objectively. In the future, we would like to conduct a study of both Japanese students and foreign students that includes the above factors and investigates differences in the prevalence of chronic pain between Japanese students and foreign students. We would also like to sample students with chronic pain and investigate their personality characteristics in further detail in the future.

In conclusion, the prevalence of chronic pain among Mie University students was 19.3%. There was no significant difference in the prevalence of chronic pain among the faculties to which the students belonged. The most frequent pain sites were the lower back, shoulder, head and knee. Chronic pain was associated with the frequency of alcohol consumption. University students with chronic pain were more neurotic than those without chronic pain.

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References

- Tran A, Nehl EJ, Sales J, Berg CJ. Problem drinking behaviors: differential effects of stress and school type on college students. *Open J Prev Med*. 2014; 4: 216-221.
- Mikolajczyk RT, Maxwell AE, El Ansari W, Naydenova V, Stock C, Ilieva S, et al. Prevalence of depressive symptoms in university students from Germany, Denmark, Poland and Bulgaria. *Soc Psychiatry Psychiatr Epidemiol*. 2008; 43: 105-112.
- Zhang Y, Deng G, Zhang Z, Zhou Q, Gao X, Di L, et al. A cross sectional study between the prevalence of chronic pain and academic pressure in adolescents in China (Shanghai). *BMC Musculoskelet Disord*. 2015; 16: article 219.
- Bohman T, Alfredsson L, Jensen I, Hallqvist J, Vingård E, Skillgate E. Does healthy lifestyle behaviour influence the prognosis of low back pain among men and women in a general population? A population-based cohort study. *BMJ Open*. 2014; 4: article e005713.
- Jenewein J, Moergeli H, Wittmann L, Büchi S, Kraemer B, Schnyder U. Development of chronic pain following severe accidental injury. Results of a 3-year follow-up study. *J Psychosom Res*. 2009; 66: 119-126.
- Sakakibara T, Wang Z, Kasai Y. Personality of patients with pain. *J Musculoskelet Pain*. 2014; 22: 125-128.
- Eysenck HJ. The measurement of personality. *Proc R Soc Med*. 1946; 40: 75-80.
- Jensen AR. The Maudsley Personality Inventory. *Acta Psychol*. 1958; 14: 314-325.
- Ooyama T, Komatsu R. Preparation and validation of Japanese Maudsley Personality Inventory. In: Japanese MPI study group, editor. *New personality inventory -Maudsley Personality Inventory*. 1st ed. Tokyo: Seishinshobo, Japanese. 1969; 115-157.
- Wang Z, Sakakibara T, Kasai Y. Personality of outpatients with malignant tumors: a cross-sectional study. *World J Surg Oncol*. 2012; 10: article 187.
- Kasai Y, Morishita K, Kawakita E, Kondo T, Uchida A. Pre-and postoperative psychological characteristics in mothers of patients with idiopathic scoliosis. *Eur Spine J*. 2006; 15: 1103-1107.
- Klemenc-Ketiš Z, Kersnik J, Eder K, Colarič D. Factors associated with health-related quality of life among university students. *Srp Arh Celok Lek*. 2011; 139: 197-202.
- Brewer BW, Karoly P. Recurrent pain in college students. *J Am Coll Health*. 1992; 41: 67-69.
- Thomas M, Roy R, Cook A, Marykuca S. Chronic pain in college students: issues of management. *Can Fam Physician*. 1992; 38: 2597-2601.
- Zvauya R, Oyeboode F, Day EJ, Thomas CP, Jones LA. A comparison of stress levels, coping styles and psychological morbidity between graduate-entry and traditional undergraduate medical students during the first 2 years at a UK medical school. *BMC Res Notes*. 2017; 10: article 93.
- Nakamura M, Nishiwaki Y, Ushida T, Toyama Y. Prevalence and characteristics of chronic musculoskeletal pain in Japan. *J Orthop Sci*. 2011; 16: 424-432.
- Nakamura I, Nishioka K, Usui C, Osada K, Ichibayashi H, Ishida M, et al. An epidemiologic internet survey of fibromyalgia and chronic pain in Japan. *Arthritis Care Res*. 2014; 66: 1093-1101.
- Sakakibara T, Wang Z, Paholpak P, Kosuwon W, Oo M, Kasai Y. A comparison of chronic pain prevalence in Japan, Thailand, and Myanmar. *Pain Physician* 2013; 16: 603-608.
- Karunanayake AL, Pathmeswaran A, Kasturiratne A, Wijeyaratne LS. Risk factors for chronic low back pain in a sample of suburban Sri Lankan adult males. *Int J Rheum Dis*. 2013; 16: 203-210.
- Ekholm O, Grønbaek M, Peuckmann V, Sjogren P. Alcohol and smoking behavior in chronic pain patients: the role of opioids. *Eur J Pain*. 2009; 13: 606-612.
- Mitchell MD, Mannino DM, Steinke DT, Kryscio RJ, Bush HM, Crofford LJ. Association of smoking and chronic pain syndromes in Kentucky women. *J Pain*. 2011; 12: 892-899.
- Ganesan S, Acharya AS, Chauhan R, Acharya S. Prevalence and Risk Factors for Low Back Pain in 1,355 Young Adults: A Cross-Sectional Study. *Asian Spine J*. 2017; 11: 610-617.
- Lim KO, Lee DY, Shin WS. The effects of a warm whirlpool bath on pain and stiffness of patients with chronic stroke induced knee osteoarthritis. *J Phys Ther Sci*. 2013; 25: 873-875.
- Keilani M, Crevenna R, Dorner TE. Sleep quality in subjects suffering from chronic pain. *Wien Klin Wochenschr*. 2018; 130: 31-36.
- White RS, Jiang J, Hall CB, Katz MJ, Zimmerman ME, Sliwinski M, et al. Higher perceived stress scale scores are associated with higher pain intensity and pain interference levels in older adults. *J Am Geriatr Soc*. 2014; 62: 2350-2356.
- Goubert L, Crombez G, Van Damme S. The role of neuroticism, pain catastrophizing and pain-related fear in vigilance to pain: a structural equations approach. *Pain*. 2004; 107: 234-241.
- Wong WS, Lam HM, Chen PP, Chow YF, Wong S, Lim HS, et al. The fear-avoidance model of chronic pain: assessing the role of neuroticism and negative affect in pain catastrophizing using structural equation modeling. *Int J Behav Med*. 2015; 22: 118-131.
- Bishop SR, Warr D. Coping, catastrophizing and chronic pain in breast cancer. *J Behav Med*. 2003; 26: 265-281.
- Hajek A, Bock JO, König HH. The role of personality in health care use: Results of a population-based longitudinal study in Germany. *PLoS One*. 2017; 12: e0181716.
- Özalp G, Sarioglu R, Tuncel G, Aslan K, Kadiogullari N. Preoperative emotional states in patients with breast cancer and postoperative pain. *Acta Anaesthesiol Scand*. 2003; 47: 26-29.