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Effects of Stress or Personality Types on Ocular Dryness, Dizziness, and Autonomic Nervous Dysfunction of Healthy Subjects in the Workplace

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Abstract

Objectives: Numerous epidemiologic studies have been published on the relation between coronary diseases and personalities associated with stress. However, few reports have been published about stress-related autonomic dysfunction in the fields of ophthalmology and otolaryngology. We investigated the relationship between autonomic nerve dysfunction and personality types.

Methods: The study group was comprised of 336 bank employees who completed a questionnaire that assessed personality type, daily anxieties, methods of relaxation, and other autonomic symptoms. The subjects were divided into three groups based on the frequencies with which they experienced each symptom. The scores of each questionnaire item were compared among the groups.

Results: The individuals who often complained of dry eye had higher scores related to the type A personality than those who did not complain of dry eye (p=0.0003). The individuals who often complained of vestibular dysfunction had higher scores related to the self-resistant type personality compared with those did not complain of those symptoms (p=0.004). Our results also showed correlations between the escape type personality and the frequency of gastrointestinal symptoms (p=0.007) and between the personality types associated with stress and the frequency of circulatory symptoms (type A personality, p=0.009; self-resistant type personality, p=0.003; escape type personality, p=0.01). The incidence of tinnitus was not related to personality type. Daily anxiety and methods of relaxation were not strongly correlated with the incidence of autonomic dysfunction.

Conclusions: We identified a correlation between stress and autonomic dysfunction. These results suggest that personality type affects subjects' symptoms of autonomic dysfunction more strongly than daily anxiety or methods of relaxation.

Keywords: Stress; Personality type; Bank employee; Vestibular dysfunction; Dry eye; Work environment

Introduction

Individuals can be exposed on a daily basis to high levels of stress that might alter autonomic nerve function and cause various diseases. Numerous epidemiologic studies have been published on the relation between stress and disease in developed countries, and it is well accepted that certain personality types are associated with an increased incidence of coronary diseases [1-3]. Individuals with a type A personality tend to be competitive, often experience stress [4-7], and are vulnerable to the development of coronary artery diseases.

Individuals with a type A personality are at lower risk for coronary diseases in Japan than those with a type A personality in the United States, which may result from ethnic differences or environment [8,9]. Hayano, et al. modified the questionnaire used to evaluate the type A personality and reported that the behavioral patterns of Japanese individuals could be estimated using a new scale [10]. The self-resistant type and escape type personalities have been reported as being associated more often with stress in Japanese individuals [11]. Individuals with a self-resistant personality are poor at asserting themselves, and they often adapt their opinions to those around them or strive to meet the expectations of others. Individuals with an escape type personality tend to escape from reality through, for example, alcohol intake, when faced with an awkward situation in which they have difficulty coping. Thus, individuals with the self-resistant type personality or the escape type personality tend to experience anxiety [12].

Office workers routinely use visual display terminals (VDTs), which are closely linked to the frequency of dry eye syndrome [13-15]. Office workers stare at VDTs for long periods during working hours, which results in a substantial decrease in the number of blinks and increased corneal desiccation. Stress caused by working with a VDT may cause an autonomic imbalance that alters pupil size [16], accommodation [17], and lacrimation. Since the relation between personality type and dry eye is unclear, we examined the relation between the risk of dry eye syndrome and stress.

We evaluated the three personality types, means of relaxation, and causes of anxiety [18-20] using our questionnaire to verify the relationship between the personalities and chronic stress.

Materials and Methods

Subjects

The members of the study group, which consisted of employees of a bank in Japan, were asked to complete a questionnaire when they underwent an annual medical examination. Replies were received from 338 of 488 employees (69.3%). We used only the 336 questionnaires that were filled out completely were used (Table 1).

Sex	No	Age				Average age (mean + SD)
		20-29	30-39	40-49	50-	
Male	184	46	38	78	22	38.7 + 9.5
Female	152	128	19	5	0	25.6 + 4.9
Total	336	174	57	83	22	32.7 + 10.1

Table 1: Classification of subjects by age and gender. The questionnaires remained anonymous and when completed they were stored in a box to maintain privacy. All protocols were reviewed by the Yamaguchi University Institutional Review Board.

Questionnaire

The questionnaire used to evaluate three categories related to stress is shown in Table 2. The category dealing with personality types contained 14 items related to the type A personality (questions 1-14), five items related to the self-resistant type personality (questions 15-19), and five items related to the escape type personality (questions 20-24). One of three responses could be chosen for each item and the score was based on the answer chosen: no (0), sometimes (1), or yes (2). The sum of the scores for each personality was evaluated. A tendency toward personality-induced stress was determined by the sum of the scores, with higher levels of stress indicated by higher scores.

A				B			
Questions about means of relaxation				**Questions about causes of diary anxiety**			
Please circle the appropriate answer in each line				**Please circle the appropriate answer in each line**			
0: no 1: sometimes yes 2: yes				0: no 1: sometimes yes 2: yes			
1. You have a violent tendency	0	1	2	1. Crowded commuter train or a long journey to work	0	1	2
2. You are unyielding	0	1	2	2. Long working hours or overtime	0	1	2
3. You tend to complete with others in everything	0	1	2	3. Contents of your work	0	1	2
4. You are easily irritated or touchy	0	1	2	4. Appraisals by others	0	1	2
5. You maintain your opinion	0	1	2	5. Relationship with your superiors	0	1	2
6. You tend to criticize others	0	1	2	6. Relationship with your co-workers	0	1	2
7. You are a perfectionist	0	1	2	7. Social relationship with your men	0	1	2
8. You tend to immerse yourself in anything you do	0	1	2	8. Your future	0	1	2
9. You forget yourself when you devote yourself to a task	0	1	2	9. Unemployment or change of employment	0	1	2
10. You tend to rattle off your opinion	0	1	2	10. Your health	0	1	2
11. You feel you never have enough time	0	1	2	11. Health of your family	0	1	2
12. You eat or walk quickly	0	1	2	12. Future of your children	0	1	2
13. You feel uneasy when you take a break	0	1	2	13. Life in your old age	0	1	2
14. You perform two tasks at once	0	1	2	14. Communication with your spouse and children	0	1	2
15. You are anxious about what other people think	0	1	2	15. Supporting your parents	0	1	2
16. You tend to be strained in public	0	1	2	16. Relationship with your parents or children-in-law	0	1	2

17. You adapt your opinion to the company you are in	0	1	2	17. Relationship with your friends	0	1	2
18. You strive to meet superior's expectations	0	1	2	18. Repayment of a loan	0	1	2
19. You swallow your disgust	0	1	2	19. Sexual relations	0	1	2
20. You tend to avoid bitter situations	0	1	2	20. Dependency on gambling	0	1	2
21. You blame others when you get into trouble	0	1	2	21. Dependency on drinking	0	1	2
22. You reproach others when you are in a bad mood	0	1	2	22. Dealings with your neighbors	0	1	2
23. You worry before you start a task	0	1	2				
24. You drown your sorrows in alcohol or karaoke	0	1	2				

C	D			
Questions about means of relaxation	**Questions about symptoms associated with anxiety**			
Please check all appropriate answers	**Please circle the appropriate answer in each line**			
1 ( ) You have hobbies	1 Dry eye	No	sometimes	often
2 ( ) You enjoy sports	2 Giddiness/fainting	No	sometimes	often
3 ( ) You are an active member of a group/society/club	3 Muffled hearing/tinnitus	No	sometimes	often
4 ( ) You enjoy the company of good friends	4 Gastrointestinal distress/ diarrhea	No	sometimes	often
5 ( ) You are valued by your colleagues	5 Palpitations/excessive perspiration	No	sometimes	often
6 ( ) You enjoy a happy home life				
7 ( ) You talk over everything with your spouse				
8 ( ) You have good superiors or colleagues				
9 ( ) You often go out				
10 ( ) You enjoy traveling				
11 ( ) You enjoy dining out or drinking				

Table 2: Study questionnaire. The questionnaire consisted of four categories about stress: personalities (a), anxiety triggers (b), and means of relaxation (c), and autonomic symptoms (d). The category concerning personality type contained items about the type A personality (questions 1-14), the self-resistant personality (15-19), and the escape type personality (20-24).

The category about anxiety triggers contained 22 items (1-9 related to work, 10-16 family and health, and 17-22 other items). One of three responses could be chosen for each question about causes of anxieties: no (0), sometimes (1), or always (2). The level of anxiety was determined by the sum of the scores, with higher levels of stress indicated by higher scores.

The category on means of relaxation contained 11 items. Six items were related to activities in a group such as hobbies, traveling, and dining, and five items were related to cooperative relations with surroundings in the office or home. The degree of relaxation was indicated by the number of corresponding items.

We also asked the study participants about the frequencies with which they experienced typical symptoms that seem to be caused by autonomic imbalances, i.e., dry eye, giddiness or fainting, muffled ear or tinnitus, gastrointestinal distress or diarrhea, and palpitations or excessive perspiration. We evaluated these symptoms with the questionnaire, because the symptoms were usual for the bank employee. Three responses, i.e., no, sometimes, or often, were provided for each symptom. The subjects were divided into three groups based on the frequencies with which they experienced each symptom. In the group in which persons responded that they often experienced symptoms, all samples were used for comparison with the other groups. The major part of samples consists of the females under 30 years old. Therefore, samples from the females under 30 years old were evaluated with the scores of questionnaire.

All scores were statistically evaluated using one-way analysis of variance and the Fisher PLSD test for multiple comparisons among the mean. All statistical analyses were conducted using Stat View 4.5J software (SAS Institute, Cary, NC) on a PowerBook G4 (Apple Computer, Cupertino, CA).

Results

The numbers of subjects responding to the questions regarding autonomic symptoms are shown in Table 3. The relation between the

frequency of dry eye and the questionnaire scores is shown in Table 4. After matching for age (± 2 years) and gender, the study data set comprised 235 samples about dry eye. The individuals in the group with the highest frequency of dry eye tended to have the highest scores of the three stress-related personalities. In particular, the score for the type A personality was significantly higher in the group that responded often compared with the other two groups that responded no or sometimes (p=0.0003 compared with the group that responded no; p=0.011 compared with the group that responded sometimes). In addition, the score for the causes of daily anxiety tended to be correlated with the frequency of dry eye, although there was no significant difference between the score and the frequency. There was no difference among the groups regarding the scores for the means of relaxation.

The relation between the frequency of otolaryngology symptoms and scores was investigated in this study. There were two consistent correlations for the scores in the analysis of giddiness/fainting. The score for the self-resistant type personality was significantly higher in the group in which the respondents answered often compared with the other groups (p=0.004 for the comparison between the group that responded often and the group that responded no; p=0.011 for the comparison between the group that responded often and the group that responded sometimes). The scores for the anxiety triggers also were related to the frequency of giddiness/fainting. There was no consistent trend regarding muffled ear or tinnitus between the questionnaire scores and symptom frequency.

Symptom	Frequency	Subjects	
		All	Female (<30 y.o.)
Dry eye	No	209	75
	Sometimes	89	29
	Often	35	25
Giddiness/fainting	No	214	69
	Sometimes	102	50
	Often	18	10
Muffled ear/tinnitus	No	273	106
	Sometimes	45	16
	Often	16	7
Gastrointestinal distress/diarrhea	No	152	61
	Sometimes	151	57
	Often	31	11
Palpitation/excessive perspiration	No	224	94
	Sometimes	99	31
	Often	10	4

Table 3: Classification of subjects by autonomic imbalances.

The relation between the frequency of otolaryngology symptoms and scores was investigated in this study. There were two consistent correlations for the scores in the analysis of giddiness/fainting. The score for the self-resistant type personality was significantly higher in the group in which the respondents answered often compared with the other groups (p=0.004 for the comparison between the group that responded often and the group that responded no; p=0.011 for the comparison between the group that responded often and the group that responded sometimes). The scores for the anxiety triggers also were related to the frequency of giddiness/fainting. There was no consistent trend regarding muffled ear or tinnitus between the questionnaire scores and symptom frequency.

Gastrointestinal and cardiovascular symptoms is the important autonomic symptoms. A consistent correlation between personality type and the frequencies of symptoms was observed. A significant difference was observed between the score for items pertaining only to the escape type personality and the frequency of gastrointestinal distress or diarrhea (p=0.007 for the comparison between the group that responded often and the group that responded no; p=0.02 for the comparison between the group that responded often and the group that responded sometimes). Significant differences were detected among the scores of the three personalities regarding palpitations or excessive perspiration (type A personality, p=0.009; self-resistant type personality, p=0.003; escape-type personality, p=0.01).

There was no significant difference in the scores of the means of relaxation regarding the frequency of all types of symptoms.

Symptom	Frequency	No.	Personality types			Daily anxiety	Relaxation
			Type A	Self-resistant	Escape		
Dry eye	No	75	8.1 ± 0.7 **	5.0 ± 0.4	2.9 ± 0.3	9.4 ± 1.0	3.9 ± 0.4
	Sometimes	29	9.3 ± 0.7 *	4.9 ± 0.3	3.4 ± 0.3	10.1 ± 1.0	4.3 ± 0.4
	Often	25	12.2 ± 0.9	5.4 ± 0.3	3.7 ± 0.3	10.8 ± 1.0	4.0 ± 3.8
Giddiness / fainting	No	69	8.8 ± 0.9	4.6 ± 0.4 **	2.9 ± 0.4	10.6 ± 1.1	4.0 ± 0.6
	Sometimes	50	9.2 ± 1.0	4.8 ± 0.3 *	3.0 ± 0.4	8.9 ± 1.2 *	4.7 ± 0.5
	Often	10	11.9 ± 1.5	6.4 ± 0.5	3.8 ± 0.4	13.4 ± 1.8	3.3 ± 0.5
Muffled ear / tinnitus	No	106	11.4 ± 1.0	4.9 ± 0.4	3.4 ± 0.5	11.6 ± 1.4	3.6 ± 0.6
	Sometimes	16	8.9 ±1.3	5.2 ± 0.5	3.3 ± 0.5	11.8 ± 1.4	3.4 ± 0.5
	Often	7	9.6 ± 1.3	5.0 ± 0.5	3.3 ± 0.4	13.1 ± 1.9	3.2 ± 0.6
Gastrointestinal distress / diarrhea	No	61	10.5 ± 1.0	4.7 ± 0.4	2.7 ± 0.3 **	10.2 ± 1.0	3.9 ± 0.4
	Sometimes	57	8.8 ± 0.7	5.3 ± 0.2	2.9 ± 0.3 *	10.1 ± 1.1	4.0 ± 0.4
	Often	11	10.9 ± 1.0	5.2 ± 0.3	4.0 ± 0.3	12.9 ± 1.3	3.3 ± 0.4
Palpitation / excessive perspiration	No	94	7.8 ± 0.8 **	3.9 ± 0.6 **	2.1 ± 0.4 *	6.7 ± 1.6 *	5.0 ± 0.7
	Sometimes	31	11.3 ± 1.6	5.2 ± 0.5	3.2 ± 0.5	12.6 ± 1.5 *	3.6 ± 0.7
	Often	4	14.0 ± 2.1	6.5 ± 0.5	4.1 ± 0.6	13.1 ± 1.8	4.6 ± 0.6

Table 4: Means and standard errors of the scores in the frequencies of symptoms regarding autonomic imbalances.

Discussion

In the present study, we used the questionnaire to verify the personality types, daily anxieties, and the means of relaxation. The questionnaire was developed by modifying Munakata's questionnaire 11 to evaluate the personality types of outpatients in Japanese clinics. The questionnaire had been evaluated for usability and validity [18-20]. The questionnaire had selected the three personalities regarding with stress in Japan. These personalities may affect the retune rate of the questioners.

In the current study, we showed that the scores for items pertaining to the three personalities evaluated were related to the frequencies of ocular symptoms. There have been few reports on the relation between ocular symptoms and behavioral characteristics. Individuals who often complained of dry eye had high scores associated with the type A personality. The subjects may be exposed to the same degree of stress and the personalities of the subjects may affect their symptoms of dry eye, because no significant difference was detected in the daily anxiety scores.

Most employees who participated in this study used a VDT. Long periods of time spent in front of a VDT could cause ocular stress, because the VDT reduces the rate of blinking and changes the tear dynamics [15]. In addition, the employees worked in an air-conditioned room that also can cause tear evaporation [21]. Furthermore, individuals with a type A personality often work at a VDT for extended periods compared with individuals who do not have a type A personality [22]. Therefore, the work environment may be causing the symptoms. In the current study, stress resulting from the work environment containing the VDT could not be evaluated. These factors can affect the frequency of autonomic imbalance. The subjects in the current study spent more time in front of a VDT, as a result of their occupation. Therefore, we analyzed the samples after stratifying for age and gender because of matching.

In addition to the work environment, the wearing of contact lenses (CLs) can be a source of stress that affects symptoms of dry eye syndrome. CLs have become increasingly popular in Japan, with 11.1% of the population wearing lenses in 2002. The percentage of CL use in young women was the greatest of all age groups, with 45.6% of females wearing CLs in the group of subjects who were between the ages of 15 and 24 years. In our study, 71% of the individuals who responded that they often had dry eye were women younger than 30 years of age. This percentage was much higher than the percentages of young females who reported other symptoms such as lightheadedness/fainting (55%) and muffled hearing/tinnitus (43%). Use of CLs often reduces the corneal oxygen supply, often absorbs essential water from the ocular surface, possibly accelerates the evaporation over the CLs, and results in dry eye [23]. In the current study, we did not evaluate the use of VDTs or CLs. This may be the reason why the results did not detect a relationship between the anxiety scores and the frequency of ocular symptoms. The questionnaire is now being revised to evaluate the relation between stress triggers and ocular symptoms.

We also investigated the personalities of subjects who reported otolaryngologic symptoms. The scores associated with personality types that tended to experience stress were higher in the group in which individuals often complained of giddiness/fainting compared with the other groups. In the current study, giddiness/fainting were considered to have been induced by orthostatic hypotension, according to a report about the incidence of giddiness in Japan. Exposure to excessive stress attenuates the autonomic function of individuals with stress-related personalities [24,25]; subsequently,

autonomic dysfunction often causes orthostatic hypotension and giddiness [26,27]. Therefore, our results agree with those of previous reports. Meanwhile, we did not detect a correlation between the frequency of tinnitus and personality types. Stressful events are risk factors in patients with Meniere's disease, which can cause giddiness, hearing loss, and tinnitus [28-31]. In addition, we reported that patients with Meniere's disease had the self-resistant type personality and the escape type personality more frequently than the normal controls [20]. The tinnitus that the study subjects complained of is likely not a symptom of Meniere's disease or an autonomic disorder.

We also studied the relation between personality and other symptoms of autonomic dysfunction, such as gastrointestinal distress/diarrhea and palpitations/perspiration. The symptoms of digestive organ dysfunction often arise from autonomic dysfunction [32], and thus these symptoms are closely related to the personalities associated with stress [33]. Palpitations and excessive perspiration were also common autonomic symptoms. The personality types played an important role as risk factors for heart diseases. Previously, we investigated the relationship between these symptoms and personality types, and the outcome was as we reported [19]. The results of the current study were consistent with numerous reports published previously, and thus the questionnaire used in our studies seems useful for evaluating personalities associated with stress.

Daily anxiety and relaxation were not strongly related to the frequencies of ophthalmic and otolaryngologic symptoms and autonomic dysfunction. The responses to daily stressful events are regulated by coping mechanisms associated with the different personality types [34].

Sociomedical aspects from an ophthalmic standpoint: Questionnaires tend to consider the causes of ocular fatigue or dryness mostly as related to workers' posture, the position and the glare of the display terminal (distance from the eye and angle from the ocular axis), and gastrointestinal and vasculo-circulatory symptoms including headache and musculoskeletal features, especially the very popular Katakori in Japanese, which differs in nature from shoulder stiffness.

Finally, the current results neither mention the degree of refractive error nor appropriate or inappropriate correction. Nonetheless, the current study shows that ocular dryness including ocular discomfort is clearly related to the type A personality. Although the type A personality seem to be considered less important in medical science except for cases of individual hostility, this study shows the impact of personality type on ocular dryness, and cautions workers and ophthalmologists about CL use. The current study, therefore, is noteworthy for CL wearers' unexpressed or neglected claims of ocular discomfort including dry eye.

We should, of course, be concerned that dry eye symptoms can be related to other factors such as employment type (full-time or part-time worker), the level of responsibility of a job, or life-style factors such as smoking, alcohol, and exercise.

Our results suggest that the differences in the personality types were attributable mainly to the frequencies of many of the symptoms. Recently, the number of patients with autonomic imbalances including dry eye has increased. If factors such as personality type affect the onset of dry eye syndrome, managing stress by evaluating personality type may be one method to treat patients.

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