

Comparison of The VDT Occupation and VDT-related Hobby Groups in terms of Patients' Subjective Symptoms of VDT Syndrome

The purpose of this study was to investigate the health conditions of occupation group and hobby group related to visual display terminal (VDT) syndrome. The VDT occupation group was mainly composed of the worker in banks, telephone companies, and general offices. The VDT-related hobby group was composed of high school students, and Internet cafe users. A questionnaire survey was conducted to classify the subjects according to hours of computer usage. The results indicated that the occupation group represented a higher level of subjective symptoms than VDT-related hobby group. In the VDT occupation group, 'Poor body condition', 'Feeling uncomfortable or pain in the neck', 'Feeling uncomfortable or pain in the back', 'Feeling stressed out', and 'Feeling uncomfortable or pain in the shoulder' items indicated a high level of subjective symptoms. In the VDT-related hobby group, 'Feeling uncomfortable or pain in the neck', and 'Feeling uncomfortable or pain in the back' items indicated a high level of subjective symptoms. According to the hours of computer usage, 4–6 hours and 6 hours or more groups represented a higher level of subjective symptoms than 2–4 hours group. These findings suggest that Visual display terminal (VDT) work effects the individual's health conditions.

Key words: *Visual display terminals; subjective symptom; occupation*

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INTRODUCTION

As computerization of the workplace has rapidly increased due to recent industrial rationalization and specialization, computer technologies have significantly advanced, and thus visual display terminals (VDT) have been widely distributed not only in offices, factories and schools, but also to households. With the increase in the use of such display devices, VDT workers started suffering from a new disease, called VDT syndrome¹⁾. Patients with VDT syndrome have multiple symptoms that appear after long-term use of TV, video game console and computer. This entity is also called work-related musculoskeletal disorders (WMSDs), cumulative trauma disorders (CTDs), and myofascial pain syndrome (MPS). The term WMSDs was defined by the World Health Organization as health problems of muscles, ten-

ons, peripheral nerves, and vascular system that are generated, preceded or aggravated by repetitive or continuous body movements²⁾.

Risk factors that have been proposed for VDT syndrome include sociodemographic factors such as gender, age, and length of work³⁻⁵⁾; working conditions such as daily working hours, daily VDT work hours, straight VDT working hours, work load, and work type⁶⁾; and other work environment-related factors such as lighting, temperature, humidity, noise, ventilation conditions, body posture, and types of VDT devices^{7,8)}. In recent studies, other factors have been reported including the effects of electromagnetic waves^{9,10)}. VDT syndrome is generally known as health problems caused by multiple factors including electromagnetic waves emitted by computer devices, excessive use of eyes, straight working hours without work shift or break time, working postures using

certain body parts, etc^{11,12)}. The subjective symptoms of patients with VDT syndrome include dim and blurry vision, bloodshot eyes, headache, gastrointestinal disorders, and pain, stiffness and numbness in the neck, shoulders, elbow joints, forearms, and wrist joints. The VDT syndrome has not been clearly defined, and the causes of the syndrome are still debatable. Previous studies that have been conducted in Korea have mostly focused on symptoms that develop in certain body parts, or have only used piecemeal approaches to identify the related factors¹³⁻¹⁸⁾. There have been few efforts to comprehensively analyze the factors related to working conditions and environment that are necessary for analyzing the overall symptoms of VDT syndrome and for establishing measures to prevent the syndrome. VDT syndrome can occur not only in VDT workers, but also in those who are addicted to the Internet.

Internet addiction disorder is characterized by excessive access to and use of computer in daily life, and it can cause serious social, mental, physical and economic problems¹⁹⁾. Excessive use of the Internet results in a wide range of negative effects on daily life²⁰⁾. In the modern society, the internet is used as an important tool in almost every part of life, including politics, economy, society and culture, and it has a tremendous impact. However, excessive use of the Internet can impair the functions of various parts of daily life, resulting in musculoskeletal and physical disorders²¹⁾. People who have physical disorders, such as eye symptoms, headache, facial pain, skin problems, poor body condition and psychological anxiety, can be diagnosed as suffering from Internet addiction. One in 3 people in their 10s to 30s in Korea has signs of Internet addiction, and especially almost half of those in their 10s seem to be addicted to the Internet²²⁾, which is attributable to free access to the Internet in school, increasing activities using e-mail services and the Internet, and 24-hr Internet cafes. These environments increase the risk of excessive Internet use²³⁾. Thus, people are naturally exposed to the risk of VDT-related health disorders.

Therefore, this study aimed to conduct a questionnaire survey in the VDT occupation (worker) group and the VDT-related hobby group, and to compare the results of the two groups so as to contribute to the development of a prevention program for VDT syndrome.

METHODS

Subjects

A questionnaire survey was conducted among people who lived in Gyeongsangnam Province in 2016, and the respondents were divided into the VDT occupation group (330 people) and the VDT-related hobby group (330 people). This questionnaire survey was conducted from January 1, 2016 to January 31, 2016. The VDT occupation group was mainly composed of people working in banks, telephone companies, and general offices. The VDT-related hobby group was composed of high school students and Internet cafe users. After excluding questionnaires that were not returned or that contained insufficient answers, a total of 283 respondents in the VDT occupation group and the VDT-related hobby group were analyzed in this study.

Methods

In the VDT occupation group, a researcher visited the offices of the subjects, distributed questionnaires, and explained to the respondents how to fill out the questionnaire. Respondents filled out the questionnaire according to the instructions and the researcher collected the questionnaires. In the VDT-related hobby group, a researcher visited schools and Internet cafes, distributed questionnaires, and explained to the respondents how to fill out the questionnaire.

General information was analyzed using frequency and percentage, and subjective symptoms were analyzed t-test. The chi-square test was used to compare between two groups. The significant level was set at $\alpha = .05$.

RESULTS

The results of general characteristics including gender, drinking, marriage and age are presented in Table 1. The number of males in the two groups was 345 (60.6%), and that of females was 224 (39.4%). The percentage of females in the VDT occupation group alone was 54.8%, which was higher than that of males in this group, while the percentage of males in the VDT-related hobby group was 75.9%, which was higher than that of females in this group. The percentages of drinkers

in the VDT occupation and VDT-related hobby groups were 65.7% and 55.2% respectively. The percentages of non-smokers in the VDT occupation and VDT-related hobby groups were 70.7% and 61.9%, respectively. With respect to the question about their marital status, 50.5% of the respondents in the VDT occupation group replied that they were married, while 95.5% of the respondents in the VDT-related hobby group replied they were unmarried. The subjects were

divided into 5 age groups (from less younger than 20 years to 50 years or older). The percentages of subjects aged 20~29 years in the VDT occupation and VDT-related hobby groups were 45.6% and 49.3%, respectively, accounting for the largest proportion of the groups, while the percentages of subjects aged 50 years or older in the VDT occupation and VDT-related hobby groups were 1.4% and 0.3% respectively, accounting for the smallest proportion of the groups.

Table 1. General characteristics of the subjects

	VDT Occupation group	VDT-related Hobby group
Gender (Male / Female)	128 (45.2%) / 155 (54.8%)	217 (75.9%) / 69 (24.1%)
Drinking (Yes / No)	186 (65.7%) / 97(34.3%)	158(55.2%) / 128(44.8%)
Smoking (Yes / No)	83 (29.3%) / 200 (70.7%)	109 (38.1%) / 177 (61.9%)
Marriage (Yes / No)	140 (49.5%) / 143 (50.5%)	13 (4.5%) / 273 (95.5%)
Age		
Younger than 20	3 (1.1%)	125 (43.7%)
20-29	129 (45.6%)	141 (49.3%)
30-39	116 (41.0%)	16 (5.6%)
40-49	31 (11.0%)	3 (1.0%)
50 or older	4 (1.4%)	1 (0.3%)

Table 2 indicates the frequency of experiencing subjective symptoms of VDT syndrome among patients. It was found that 136 respondents (48.1%) in the VDT occupation group answered "frequently," and 88 respondents (31.0%) in the VDT-related hobby group answered "frequently" and "once a week" respectively, representing a statistically significant difference (P<0.05).

Further, 142 subjects (50.2%) in the VDT occupation group replied that they spent 6 hours or

longer, and 85 subjects (30.0%) in the VDT-related hobby group replied that they spent 2~4 hours, representing a statistically significant difference (P<0.05). The questionnaire survey was conducted to classify the subjects according to the hours of computer usage (2~4 hours, 4~6 hours, and 6 hours or more) (Table 3). The 5-point scale was used for questions on subjective symptoms (0 = none, 1 = minimal, 2 = moderate, 3 = severe, and 4 = extremely severe).

Table 2. Frequency of experiencing subjective symptoms of VDT syndrome

	Frequently	Once a day	Once a week	Once a month	None	X ²	P
VDT Occupation group	136 (48.1%)	58 (20.5%)	54 (19.1%)	26 (9.2%)	9 (9.3%)		
VDT-related Hobby group	88 (30.8%)	57 (19.9%)	88 (30.8%)	33 (11.5%)	20 (7.0%)	23.423	0.000
Total	224 (39.4%)	115 (20.2%)	142 (25.0%)	59 (10.4%)	29 (5.1%)		

Table 3. Average hours of computer usage per day

	Less than 2 hours	2–4 hours	4–6 hours	6 hours or more	X ²	P
VDT Occupation group	15 (5.3%)	54 (19.1%)	72 (25.4%)	142 (50.2%)		
VDT-related Hobby group	72 (25.2%)	85 (29.7%)	65 (22.7%)	64 (22.4%)	74.136	0.000
Total	87 (15.3%)	139 (24.4%)	137 (24.1%)	206 (36.2%)		

The groups of 4–6 hours and 6 hours or more generally representing a high level of subjective symptoms than the 2–4 hour group (Table 4). The VDT occupation group generally representing a higher level of subjective symptoms than the VDT-related hobby group. In the VDT occupation group, 'Poor body condition', 'Feeling uncomfortable or pain in the neck', 'Feeling uncomfortable or pain in the back', 'Feeling stressed out', and 'Feeling uncomfortable or pain in the shoulder' items indicated high level of subjective symptoms (score more than 3). In the VDT-related hobby group, 'Feeling uncomfortable or pain in the neck', and 'Feeling uncomfortable or pain in the back' items indicated a high level of subjective symptoms (score more than 3). In the comparison of between groups, there are no significant differences in the 2–4 hours group. However, in the 4–6 hours and 6 hours or more groups, there are significant differences. In the 4–6 hours group, 'Pain in eyes', 'Tingling face', 'Feeling heavy in feet', 'Yawning frequently', 'Feeling uncomfortable or pain in the fingers', 'Feeling stressed out', 'Feeling difficult to breathe', 'Changing voice', and 'Feeling uncomfortable in funnel chest' items indicated significant differences between two groups. In the 6 hours or more group, 'Pain in eyes', 'Tingling face', 'Poor body conditions', 'Psychological anxiety', 'Feeling heavy in feet', 'Feeling stressed out', 'Difficult to remember small things', 'Feeling uncomfortable or pain in the shoulder', 'Feeling difficult to breathe', 'Changing voice', 'Shaky hands and feet', 'Feeling uncomfortable in funnel chest', 'Have indigestion', 'Have constipation', 'Feeling sweaty', and 'Feeling drowsy' items indicated significant differences between two groups.

DISCUSSION

VDT syndrome refers to all diseases that develop in any person who works in front of a monitor. Thus, it includes health disorders that are caused

by a combination of various factors including electromagnetic waves emitted by computer monitors and radiation, excessive use of eyes, long working hours without work shift or break time, working postures using certain body parts only, etc. Thus, VDT syndrome is a modern-day occupational disease that is found in a computerized and automated society. As using a computer has become a daily life routine not only in offices but also in houses due to the rapid spread of visual display terminals (VDT), VDT-related health issues have become a serious matter of concerns also for ordinary people.

Risk factors for VDT syndrome include sociological factors such as gender, age and length of work; working conditions such as daily working hours, daily VDT working hours, straight VDT working hours, work load, and work type²⁴⁾, and other work environment-related factors such as light, temperature, humidity, noise, ventilation conditions, body posture, and types of VDT devices^{7, 25, 26)}. In a study that assessed psychological factors such as changes in amount of work, break time, satisfaction with work, and awareness regarding the harmful effects of VDT, 21% of the respondents were satisfied with their work, 64.4% of the respondents were not very satisfied with their work, and 14.6% of the respondents were not satisfied with their work, indicating that a total of 79% of the respondents were not satisfied with their work²⁷⁾. Therefore, this study classified the participants into the VDT occupation and VDT-related hobby groups from among the patients with VDT. Also, a questionnaire survey was conducted to classify the subjects according to the hours of computer usage.

In this study, the VDT occupation group generally represented a higher level of subjective symptoms than the VDT-related hobby group. In the VDT occupation group, 'Poor body condition', 'Feeling uncomfortable or pain in the neck', 'Feeling uncomfortable or pain in the back', 'Feeling stressed out', and 'Feeling uncomfortable or pain in the shoulder' items indicate a high level of

subjective symptoms. In the VDT-related hobby group, 'Feeling uncomfortable or pain in the neck', and 'Feeling uncomfortable or pain in the back' items indicated a high level of subjective symptoms. Both the VDT occupation group and

VDT-related hobby group represented pain in the neck and back. In a study conducted among female bank tellers who worked in the five banks, many respondents answered that they always felt pain

Table 4. Subjective symptoms according to the hours of computer usage

	VDT Occupation group			VDT-related Hobby group		
	2-4 hours	4-6 hours	6 hours or more	2-4 hours	4-6hours	6 hours or more
Pain in eyes	2.76	2.64*	2.73‡	2.11	2.34	2.32
Headache	2.22	2.49	2.59	2.35	2.31	2.32
Tingling face	1.73	2.24*	2.10‡	1.68	1.71	1.51
Skin troubles	2.03	2.53	2.36	2.13	2.20	2.32
Poor body conditions	2.64	2.86	3.09‡	2.51	2.69	2.66
Psychological anxiety	2.02	2.46	2.48‡	2.03	2.16	2.12
Feeling heavy in hands	1.87	2.48	2.55	2.07	2.17	2.44
Feeling uncomfortable or pain in the neck	2.87	3.07	3.24	2.86	2.76	3.11
Feeling uncomfortable or pain in the back	2.40	2.76	3.01	2.78	2.80	3.08
Feeling heavy in feet	2.27	2.31*	2.35‡	1.79	1.93	1.63
Yawning frequently	2.20	2.78*	2.58	2.42	2.18	2.54
Feeling uncomfortable or pain in the fingers	1.87	2.52*	2.44	2.11	2.11	2.38
Feeling uncomfortable or pain in the chest	2.20	2.54	2.68	2.19	2.46	2.54
Feeling stressed out	2.73	3.00*	3.31‡	2.39	2.36	2.40
Difficult to remember small things	2.13	2.57	2.63‡	2.01	2.21	1.97
Feeling uncomfortable or pain in the shoulder	2.87	2.87	3.33‡	2.61	2.79	2.83
Feeling difficult to breathe	2.07	2.43*	2.39‡	1.69	1.85	1.68
Feeling uncomfortable or pain in the wrist	1.87	2.44	2.65	2.03	2.24	2.49
Dry mouth	1.60	2.31	2.22	2.07	1.96	1.98
Changing voice	1.80	2.28*	2.22‡	1.86	1.86	1.60
Shaky hands and feet	1.73	2.00	2.08‡	1.64	1.89	1.55
Feeling uncomfortable in funnel chest	1.67	2.04*	2.13‡	1.68	1.65	1.77
Have indigestion	2.13	2.59*	2.56‡	2.13	2.07	2.08
Have constipation	2.13	2.17	2.47‡	2.00	1.87	1.85
Feeling dizzy	2.20	2.22	2.44	2.29	2.24	2.20
Feeling sweaty	1.87	2.13	2.19‡	1.90	1.82	1.72
Feeling drowsy	1.93	2.69	2.71‡	1.85	2.36	2.32

0 = none, 1 = minimal, 2 = moderate, 3 = severe, 4 = extremely severe

* Significant difference between VDT-occupation and VDT-related Hobby groups in the 4-6 hours group

‡ Significant difference between VDT-occupation and VDT-related Hobby groups in the 6 hours or more group

in the shoulders or the back, and that they always felt pain and stiffness in the neck or the back²⁸⁾. According to a previous study, on the "Working Environment and Condition of Telephone Operators", subjective symptoms were affected by work environment and the most common conditions were eye-related disorders, followed by musculoskeletal disorders, poor body conditions, and mental, skin and neurological symptoms. Similar symptoms were also found in studies conducted among by the other research groups²⁹⁾. Also, the results of this study indicated that the groups of 4–6 hours and 6 hours or more generally represented a high level of subjective symptoms than the 2–4 hours group. In the comparison of between groups, there are no significant differences in the 2–4 hours group. However, in the 4–6 hours and 6 hours or more groups, there are significant differences. This indicates that it means that more than 4 hours of computer usage per day was marked in subjective symptoms. More than 2–3 hours of computer usage may increase the neck-shoulder pain, and more than 5 hours may increase the low back pain³⁰⁾. The results of this previous study were consistent closely with the results of this study.

In this study, both the VDT occupation and VDT-related hobby groups represented similar subjective symptoms. However, in the VDT occupation group, subjective symptoms were higher than that in the VDT-related hobby group. This indicates that VDT syndrome can be attributable to psychological factors associated with work stress. Psychological factors develop in inappropriate working conditions such as very confined working spaces compared to amount of work, inappropriate lighting conditions, high work intensity, long working hours without break time, and irregularity in amount of work. To prevent the development of symptoms, straight working hours longer than 1 hour should be avoided, and after one session of work, people should take a break of at least 10 minutes before returning to work. If long straight working hours are inevitable, it is necessary to take a short break at least a couple of times. In addition, proper height of the desk, sufficient working space on the desk, and sufficient space for legs under the desk should be secured. It will also be effective in reducing the occurrence of VDT syndrome and minimizing the symptoms by reducing screen reflection under proper natural lighting and lighting conditions. As a limitation of this study, the multifaceted char-

acteristic of the VDT syndrome limited a detailed analysis. Therefore, future studies should investigate the multifaceted characteristic of the VDT syndrome. The authors of this study hope that these results will be used to develop a prevention program for VDT syndrome.

CONCLUSIONS

According to the results of this study, in workers who had visual display terminal syndrome, it affected their health condition regardless of their professional jobs. Therefore, we suggest health promotion management techniques for workers who have visual display terminal syndrome.

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