

Comparison Study of Psychophysiological State Changes by Workshop Healing Program

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Abstract: *It is known that about 19.9% of scientific investigators are vulnerable to post-traumatic stress disorder due to frequent contact with shocking cases such as murder and decomposing bodies. Korean National Police Agency's bureau has conducted workshop program to strengthen their psychological capabilities. As a result, the quantitative measurement of psychophysiological state and workshop effects of agents was required, and psychophysiological state of agents before and after the workshop was measured using vibraimage technology. Before and After workshop, the average level of brain fatigue conditions, in a comprehensive indicator of Vibraimage parameters, changed from 0.09 to -1.03. The effects of the workshop could not be satisfactorily determined due to the lack of statistically significant differences. Brain fatigue conditions are correlated with positive emotion variables, indicating that the increase or decrease in positive emotion variables is largely affected by the brain fatigue state.*

Keywords: *Vibraimage, Psychophysiology, Brain fatigue, Job stress, Polygraph investigation.*

Recently, six police officers having post-traumatic stress disorder (Kim, 2017) attempted suicide for three months from October 2019 to January 2020, killing five people. According to media reports, the suicide rate of Korean police officers is 2.5 times higher (HANGYERAE, 2020) than that of all civil servants. Suicide of police officers does not end up as a personal matter, but a loss of the means of executing the state's public power and of the national volunteers. In particular, police officials who witnessed the suicide of fellow police officers cannot be dismissed as a simple matter, given that the chain reaction makes it more difficult to actively provide security services depending on the feeling of lethargy (Ahm&Ho, 2015). According to a study of stress-inducing factors (Bobrov&Scheblanov, 2018) by police officers (Jeong&Chong, 2012), among the causes of stress-inducing factors, it is highly likely to be caused in the order of personnel management, job characteristics, and physical environment factors. The factors of personnel management and physical environment can be improved by system or policy, but since job characteristics are low in variability, research on the degree of stress will be needed by subdividing job characteristics. As a result, 19.9% of the high-risk PTSD (Post-Traumatic Stress Disorder) were found in the Gwangju Metropolitan Police Agency

in 2017. In response, the National Police Agency pushed for workshops to strengthen the psychological capabilities of scientific investigators, and in order to understand the effects and psychophysiology of agents, it used a non-contact, non-restraint and human rights-friendly Vibrasystem used in polygraph tests.

Material and Method

The study says that MRI scans of the brain show two or three times the circuitry between the brain region that accepts the senses in the brain of a chronic fatigue patient and the brain region that determines it (SBS, 2017). Studies have shown that DMN activity is related to the mental domain of humans, with brain fatigue related to the activation of DMN (Default Mode Network) (Raichile, 2001), and significant differences reported in brain region activation studies involving schizophrenia patients and healthy people. Feeling tired without any special psychological, pathological or physiological causes may be caused by excessive activation of DMN, which is activated when nothing is done, and the concept of ‘brain fatigue’ was established (Hyoung, 2018). In Vibrasystem based on vibraimage technology (Minkin, 2017; 2020; Minkin&Nikolaenko, 2007; 2008), the brain fatigue state index is divided into three levels: Health (-2.0 or higher), Warning (-2.0 to 5.0) and Severity (below 5.0), and Warning and Severity are strictly applied as criteria for detecting the abnormal state (MINDEYE, 2018).

For those subjects who attended the workshop, one minute each was measured at the time of entry and exit, and it took an average of five minutes, including explanation time for each person. The measurement tested 29 people by installing two Vibrasystem in front of the seminar room, which was relatively quiet and created a free atmosphere.

1) Brain fatigue index

According to an analysis of ‘Before and After workshop’ measurements of 29 people around “brain fatigue”, the index for brain fatigue was 26 for “Normal”, 2 for “Warning”, and 1 for “Serious”, at the state of ‘Before workshop’. However, at ‘After workshop’, the results were 21 ‘Normal’ persons, 3 ‘Caution’ persons and 5 ‘Fatal’ persons. The average index of brain fatigue fell from 0.09 to -1.03 , which did not show the satisfactory improvement apparently. T test results did not indicate the effect of its workshop program (table 1 $t=0.683$, $p=0.5$)

Table 1

Difference between Before and After Workshop

Group	N	Average	Standard Deviation	<i>t</i>	<i>p</i>
Before Workshop	29	0.09	3.43	0.683	0.500
After Workshop	29	-1.03	3.49		

2) Factors affecting the state of brain fatigue

Among 10 Vibraimage parameters, the average number of positive variable (balance, energy, charisma, self-regulation) dropped by 17.7, the average number of negative variable (aggressive, stress, anxiety, doubt) rose by 10.5, and the average number of physiological variable (inhibition, neurocism) fell by 0.3 (See Figure). As a result, the increase or decrease in positive variable has most affected the state of brain fatigue, and among them, the decrease in ‘After measurement’ seems to have made a significant impact. In addition, the results of verification through correlation and regression analysis between each variable were analyzed that the drop in the positive variable had a significant impact on the decrease in the brain fatigue state index.

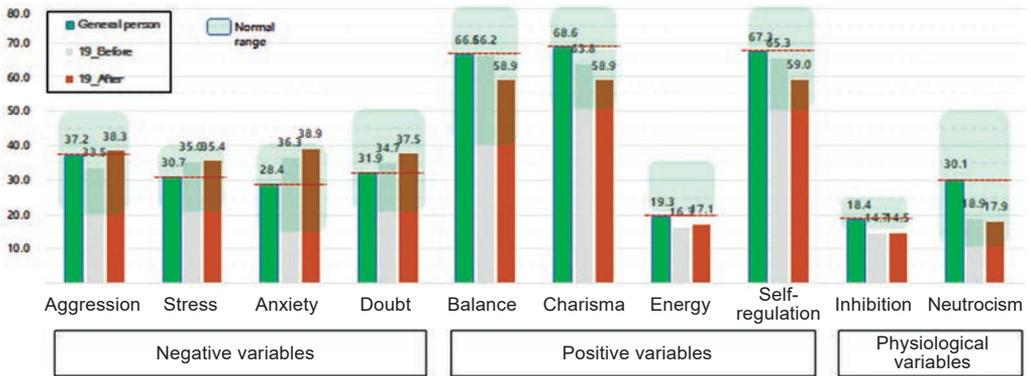


Figure. M comparison of 10 parameters for 29 persons in ‘Before and After testing’

Before workshop, brain fatigue state is the correlation between the major variables in table 2. The brain fatigue state showed the significant static correlation with the positive variable ($r = .717, \rho < .001$) and the significant negative correlation with the physiological variable ($r = -.445, \rho = .016$). On the contrary, Brain fatigue state did not correlate with the negative variable. Positive variable had a significant correlation with the physiological variable on the opposite direction ($r = -.515, \rho = .004$).

Table 2

Correlation analysis among brain fatigue variables at Before workshop

Item	1	2	3	4
1. Brain fatigue index	1			
2. Negative variables	-.334	1		
3. Positive variables	.717***	-.347	1	
4. Physiological variables	-.445*	.105	-.515**	1

Table 3 at Before workshop shows the verification results how the major variables impact to the brain fatigue state.

Table 3

Correlation analysis between the major variables impacted to brain fatigue in Before workshop

Dependent variable	Independent variable	B	S.E	β	t	p	VIF
Brain fatigue	(Constant)	6.959	7.974		-0.873	.391	
	Negative variable	-0.028	0.039	-.107	-0.728	.474	1.146
	Positive variable	0.056	0.015	.622	3.662***	.001	1.544
	Physiological variable	-0.041	0.059	-.113	-0.702	.489	1.373
F=9.481($p < .001$), $R^2 = .532$, adj $R^2 = .476$, D-W=2.164							

The statistics of correlation analysis are so reasonable and valid as shown on table 3. If you look at the results of the significant verification of the regression coefficients, the positive variable ($\beta = .622$, $p < .001$) only impacts to the brain fatigue state in the positive way. In other words, the higher the positive variable, the higher improved the brain fatigue index.

After workshop, brain fatigue state is the correlation between the major variables in table 4. The brain fatigue state showed the significantly static correlation with the positive variable ($r = .991$, $p < .001$), negative variable ($r = -.592$, $p = .001$) and physiological variable ($r = -.381$, $p = .041$) shows the significantly negative correlation. The positive variable does not correlate with physiological variable.

Table 4

Correlation analysis among brain fatigue variables at After workshop

Variable	1	2	3	4
1. Brain fatigue	1			
2. Negative variable	-.592**	1		
3. Positive variable	.991***	-.576**	1	
4. Physiological variable	-.381*	.439*	-.303	1

Table 5 at After workshop shows the verification results how the major variables impact to the brain fatigue state. The statistics of correlation analysis are so reasonable

and valid as shown on table 5. If you look at the results of the significant verification of the regression coefficients, the positive variable ($\beta = .622, p < .001$) impacts to the brain fatigue state in the positive way. And physiological variable ($\beta = -.091, p < .001$) impacts in the negative way. In other words, the higher the positive variable and the lower the physiological variable, the higher improved the brain fatigue index.

Table 5

Correlation analysis between the major variables impacted to brain fatigue at After workshop

Dependent variable	Independent variable	B	S.E	β	t	p	VIF
Brain fatigue	(Constant)	-11.065	0.949		-11.663***	< .001	
	Negative variable	0.001	0.005	.005	0.171	0.866	1.693
	Positive variable	0.058	0.002	.966	38.769***	< .001	1.504
	Physiological variable	-0.041	0.010	-.091	-4.019***	< .001	1.245
F = 9.481 ($p < .001$), $R^2 = .532$, adj $R^2 = .476$, D-W = 2.164							

Discussion

The overall comparison between Before workshop and After workshop was resulted in that 21 subjects were Normal, 13 subjects even with a slight decrease of brain fatigue index and 8 subjects with a light increase of brain fatigue index, and 8 subjects are tested by Warning or Serious state in brain fatigue. The root cause that brain fatigue index was changed from 0.09 (Before workshop) to -1.03 (After workshop) is the reason why brain fatigue index of 8 subjects were too much decreased. They may not be improved and recovered in a short time because they may have some pathological problems in psychology and mental. They need to keep tracked and monitored what's going on in the psychophysiological state even after this healing workshop program.

Overall, the brain fatigue condition is within the normal range, but the biggest factor was the decrease in positive variables. This can be assumed to be a temporary change in emotions that interacts with the excitement and discomfort of returning to work after the workshop. Those subjects to the Warning and Serious phase were given an opportunity to improve their self-efficacy in mental health and work ethics by sympathizing with their unbalanced emotional state with the quantitative emotion figures by Vibrasystem. This measurement is sensitive to noise and other people's eyes (external environment) and affects detailed indicators according to individual propensity. For accurate measurement, is recommended to measure it in an environment like a polygraph test room or quiet individual room. Due to the nature of the workshop, there was a limit to exposure to external interference phenomena

due to the nature of the workshop, and two inspectors measured to measure many subjects in a short period of time, and there may be a possibility that rapport building between inspectors and subjects affected the results.

Conclusion

This workshop served as an opportunity to improve post-traumatic stress disorder for scientific investigators who are dispatched to traumatic events as an infringement of mental health. At this point, the workshop on strengthening the psychophysiological capacity of scientific investigation was an opportunity to further enhance the sensitivity of mental health to a kind of scientific investigation personnel and establish themselves as a culture. It shares the usual difficulties of the field, which has not been able to appeal to national scientific investigators and is formed with a colleague support to strengthen the work ethic. It is expected to lead to self-efficacy by spreading the work of scientific investigation to scientific investigators.

Therefore, some suggestions are made based on the results of the measurement of the brain fatigue by Vibrasystem.

First, the psychological counseling, such as national police hospitals, is recommended freely for those subjects tested by Warning or Serious state.

Second, the regular scientific investigation psychological competency enhancement workshop will be established as mental and cultural events. It can improve the fellow's support, work ethic and increase self-efficacy.

Third, any scientific investigator should use the Vibrasystem to expand the chances for the subject to check his current psychophysiological state (measurable by remote or visit). You need to know your condition correctly to prevent and strengthen it.

Fourth, we expect to increase synergy effect by linking the Vibrasystem with the professional counselor who will be in charge of psychophysiological care. The mental health of police officers is a necessary and sufficient condition for the means of executing state powers. The psychological shock of scientific investigators who are constantly exposed to traumatic events should be adequately addressed. When the positive elements of the psychophysiology of scientific investigators are consciously and unconsciously expressed, they can provide active and high-quality security services to the public.

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