

바이오피이드백 치료에서 나타나는 신체변수(EDR, EMG)의 특성

Characteristics of Physiological Variables(EDR, EMG) in Biofeedback Treatment

서만길¹ · 한우상³ · 이경규⁴ · 유범희² · 이유리² · 김이영² · 김현우⁴

Man-Kil Seo,¹ Woo-Sang Han,³ Kyung-Kyu Lee,⁴ Bum-Hee Yu,²
Yu-Ri Lee,² Eyong Kim² and Hyun-Woo Kim⁴

■ ABSTRACT

Objectives: We explored the characteristics of physiological variables such as electrodermal response(EDR) and electromyography(EMG) in patients with insomnia, panic disorder, and other anxiety disorders. we aimed to decide the minimum sessions in biofeedback treatment to make the treatment effective and examine the effects of long-term biofeedback treatment by measuring the physiological variables.

Methods: Thirty seven outpatients who received biofeedback treatment were divided into 3 groups according to the number of biofeedback sessions(patients who received 4-5 sessions, who received 6-9 sessions, and who received more than 10 sessions). We measured mean and delta values of EDR and EMG levels, and the Hamilton Anxiety Rating Scale(HARS), and Slef-Relaxation Inventory(SRI) in all patients. Data were analyzed by t-test and repeated measures analysis of variance.

Results: The mean and delta values of EDR and EMG levels were not different among the 3 groups during the first 4 biofeedback sessions. However, patients who received more than 10 biofeedback sessions had higher baseline mean EDR value($F=2.233$, $p=0.036$) in the first session, compared with other patients. In patients who received more than 10 biofeedback sessions, mean EDR was significantly reduced after 5th session($F=10.41$, $p<0.01$). They showed significant improvement in SRI scores at 12th biofeedback session($t=2.726$, $p<0.05$) and in HARS scores at 6th($t=3.10$, $p<0.05$) and 12th biofeedback session($t=10.93$, $p<0.001$).

Conclusions: We suggest that patients should receive more than 5 biofeedback sessions to experience internal cues and get a good clinical response to biofeedback treatment. *Sleep Medicine and Psychophysiology 1999 ; 6(1) : 38-45*

Key words: Biofeedback · Electrodermal Response · Electromyography · Internal cues.

서 론

Jacobson(2)

1920

(1).

(psychoneurotic)

(Progre-

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Dankook University, Graduate School of Medicine, Department of Psychiatry, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

2

Department of Psychiatry, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

3

Bucheon Sejong Hospital, Bucheon, Korea

4

Department of Psychiatry, Cheon An Hospital, Dankook University School of Medicine, Cheon An, Korea

Corresponding author: Bum-Hee Yu, Department of Psychiatry, Samsung Medical Center, Sungkyunkwan University School of Medicine, 50 Ilwon-Dong, Kangnam-Ku, Seoul 135-230, Korea

Tel: 02) 3410-3583, Fax: 02) 3410-0050

E-mail: chris12@samsung.co.kr

ssive Muscular Relaxation : PMR)

(3). Shultz가 (psy - chosomatic disorder) (neurotic synd - rome) 가 (autogenic training)(4)

, 1960

EDR EMG 가 가

대상 및 방법

1. 연구대상

, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition(DSM -)

1995 6 1998 3

130

(posttraumatic stress disorder)

70 37 (23 , 14)

(5 - 11).

(relaxation training) 20

11 , 10 , 10 ,

가

6

, 가

5

9

(EMG biofeedback), (zen)

37

10

, Benson

, 6 9

4 5

, Basmajian

,

14 , 14 , 9

(autogenic tra - ining and bio - feedback combined method)

2. 연구도구 및 방법

Shultz가 (heaviness),

1) 연구도구

(warmth), (respiration)

(solar plexus warmth)

(1)

(Electroencephalography : EEG), (Finger Tem - perature : T), (Electromyography : EMG),

J&J

Neurodata®

(Electrodermal Response : EDR), (Blood Pres - sure : BP), (Hea - rt Rate : HR)

1

EMG 2

EDR

가

EMG

가

(pronation)

1980

, 1985

(12)

EMG

1/4(25%)

(13,14)

(2)

가 가

가

가

Basmajian

Hamilton (HARS)(15) Crist 가 (SRI)(16,17)

HARS

14

5

EMG, EDR

1 , 6 , 12

가

가 . SRI (physiological tension scale), 가 (physical assessment scale) (cognitive tension scale) , 0.89, 0.95, 0.81 가 , ANOVA 가 45 (3) , 5 , 12

(2) 4 EDR EMG 가 4 , ANOVA (3) 10 EDR EMG ANOVA(ge- neral linear model) , 가 가

2) 연구방법 Basmajian 가 (au - togenic training and biofeedback combined method) (Relaxation - Stress - Recovery Profile) 가 , Hamil - ton (HARS) . 2 (heaviness) , , , , 6 . 10

(4) 14 8 HARS SRI 가 SRI Pai - red T - test 가 , HARS 1 , 6 , 12 Paired T - test SPSS 7.0 for Windows

결 과

, 11 가 가 12 HARS SRI 가 . 1 , 45 , 5 8 , EDR, EMG 3 , 20 (가 5 , 10 , 가 5) , 15

1. 인구학적 특성

1

가

2. 첫 치료시간의 세 구간 신체변인의 차이

EDR, EMG

mEMG, dEMG, dEDR

mEDR 10

가

3) 평가방법 및 통계처리

(3) (20)

EDR EMG 가 .

EDR EMG (mean :

m) , EDR EMG

(delta :

) .

(1) EDR EMG

ANOVA

Table 1. Demographic data of patients in the biofeedback

	10 session group	6 - 9 session group	5 session group
Number	14	14	9
Sex			
M	3	5	6
F	11	9	3
Age	52.3 ± 5.4	49.6 ± 26.2	24.3 ± 7.8
Education(yrs)	14	16	16
Illness(N)			
Insomnia	3	7	0
Panic disorder	6	3	1
Other anxiety disorders	2	2	7
Tension	3	2	1
Headache			

Table 2. Change of mean value of EDR and the EMG at first session in three groups

	>10 session group(N = 14)	6 - 9 session group(N = 14)	<5 session group(N = 9)	df	F	p
mEMG ^a	6.73(2.3)	5.79(2.4)	5.6 (2.3)	36	0.823	.544
Demg	7.11(12.4)	3.66(2.5)	2.08(2.2)	36	1.247	.383
mEDR ^b	16.4 (7.2)	11.37(5.1)	13.28(6.3)	36	2.233	.036*
dEDR	4.45(4.9)	2.60(4.8)	5.14(6.0)	36	0.775	

one-way ANOVA, Posthoc test: Turkey HSD

a: uV b: micromhos

mEDR: mean electrodermal response

dEDR: delta electrodermal response

mEMG: mean electromyography

dEMG: delta electromyography

Table 3. Change of mean value of EDR and EMG during the first 4 sessions in three groups

Variables	10 session group (N = 14)	6 - 9 session group (N = 14)	5 session group (N = 9)	df	F
mEMG ^a	6.54(1.7)	5.48(1.3)	6.84(3.0)	33	1.649
dEMG	3.75(3.6)	2.81(1.4)	2.25(1.1)	32	2.666
mEDR ^b	13.69(6.5)	9.91(4.5)	11.93(6.2)	34	
dEDR	4.43(3.1)	3.22(2.6)	3.30(2.6)	35	1.24

a: uV b: micromhos, one-way ANOVA

mEDR: mean electrodermal response

mEMG: mean electromyography

dEDR: delta electrodermal response

dEMG: delta electromyography

Table 4. Change of mEDR between sessions in the group who received more than 10 sessions

Between sessions	Mean square	F
Theta 1 ^a	217.211	25.279***
Theta 2	.547	.073
Theta 3	30.263	2.933
Theta 4	139.881	10.410**
Theta 5	15.005	1.226
Theta 6	99.103	2.508
Theta 7	109.181	3.771
Theta 8	297.155	8.788*

*p<.05 **p<.01 ***p<.001

a: theta n: change between the delta value of n th - (n + 1)th and (n + 1)th - (n + 2)th session

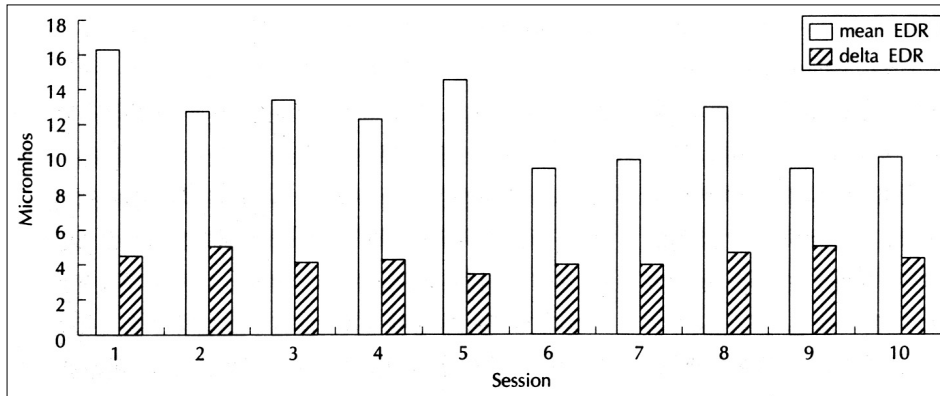


Fig. 1. Change of mean EDR and delta EDR in the group who received more than 10 sessions.

(2). 5 6
(p<.01) (4).
3. 세 구간 초기 4회동안 EDR과 EMG의 변화 가 ,
4 EDR EMG 8,9
가 mEMG
(3). 가 가 (2). EDR
(1), EMG 3
4. 10회 이상 치료군의 치료 횟수별 특성 (2).
10 14 mEDR mEMG
, mEDR
6
(1), 1 2 8 9 12 (SRI)
5. 10회 이상 치료군의 바이오피드백에 의한 불안감소 및
이완정도

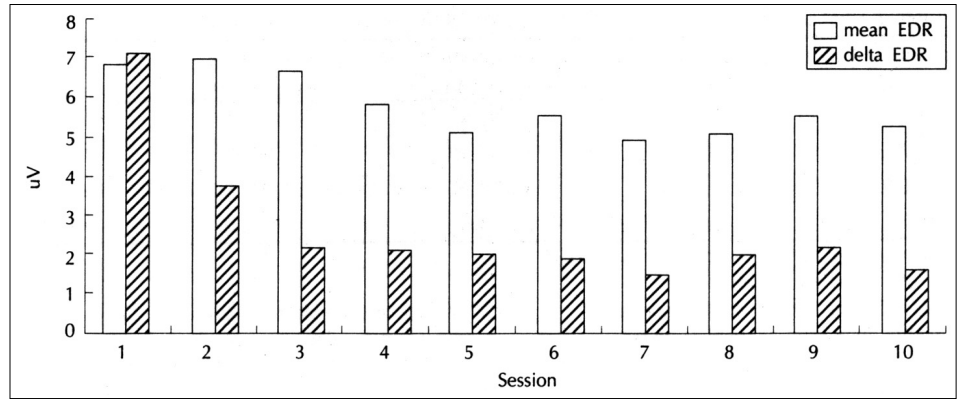


Fig. 2. Change of mean EMG and delta EMG in the group who received more than 10 sessions.

Table 5. Change of SRI(self-relaxation inventory) in the group who received more than 10 sessions

	1st session	12th session	t-value
Mean	84.375	63.8750	
SD	25.1733	20.1029	2.726*

*p<.05 SD: standard deviation

Table 6. Change of HARS(Hamilton anxiety rating scale) in the group who received more than 10 sessions

Session	Mean	SD	df	t-value
1st - 6th	4.3750	3.998	7	3.10*
6th - 12th	3.6250	2.560	7	4.01**
1th - 12th	8.0000	2.070	7	10.93***

*p<.05 **p<.01 ***p<.001
SD: standard deviation

Paired T - test 가 5
, 1 , 6 , 12 Hamilton
(HARS) 가 1 6 , 6 12 , 1
12 Paired T - test 6

고 찰

10 mEDR mE -
MG 가 가 가
가 mEDR
, mEMG
. 1989 Adler(18)
가

EMG biofeedback 가

가
EMG biofeed -
back EDR
(14). 1
EDR, EMG 가
가
EMG EDR
Adler(1989)(18) EDR, EMG
가
(overcontrol)
(chronic physiological defenses)
(affect)가
(1994)(14)
(Minnesota Multiphasic Person -
ality Inventory)

10
6 EDR
. Stoyva(1989)(19)
1 EMG
가
가
가
가
(21). 10
10 5
EDR
EMG
가
5 가
가
가
가
가
가
10
. Basmajian(1989)(20) 가 SRI HARS SRI 10
1, 2 가 가
14
1.0 μ V가
(Frontal EMG)
3.5 μ V 가
가
가
요 약
목 적 :
1.0 μ V
(EDR) (EMG)가
3 μ V 가 가
가
(11,21). 가
방 법 : 130
4 37
가 (heavin -
ess) 5 (warmth)
6 9 , 10
Basmajian (autogenic tra-

ining) 12

(Hamilton Anxiety Rating Scale)

가 (Self - Relaxation Inventory)

결 과 : 1) EDR, EMG
mEDR

2) 4
mEDR, mEMG deltaEDR, deltaEMG

3) 10 14
EDR, EMG mEDR

4)
10 14

가가 가 8
Hamilton 가 T -

value = 10.93, $p < 0.01$ / T - value = 2.726, $p < 0.01$

결 론 : 1) 가 2) 4
EDR, EMG

3)
mEDR

5 4)
가

중심 단어 : EDR · EMG ·

REFERENCES

1. Steven LF, Patricia AN. Self-regulation of Anxiety. Bulletin of the

- Menninger Clinic 1990;54:217-231;:
- Jacobson E. Electrical measurements concerning muscular contraction (tonus) and the cultivation of relaxation in man, studies on arm flexors. *Am J Physiol* 1933;107:230-248
 - Basmajian JV. Principles and practice for clinicians, Biofeedback. Baltimore, Williams and Wilkins;1989. p.1-3
 - Shultz JH, Luthe W. Autogenic Training, New York, 1969. In, Biofeedback, Basmajian (eds), Baltimore, Williams and Wilkins;1989
 - Schwarz SP, Blanchard EB. Evaluation of a psychological treatment for inflammatory bowel disease. *Behav Res Ther* 1991;29(2):167-177
 - Arena JG, Bruno GM, Hannah SL, Meador KJ. A comparison of frontal electromyographic biofeedback training, trapezius electro-myographic biofeedback training and progressive muscle relaxation therapy in the treatment of tension headache. *Headache* 1995;35(7):411-419
 - Dubravica M, Musura M, Nesek Madaric V, Stajner Katusic S. Treatment of facial palsy by EMG biofeedback technique-Muscle relaxation technique. *Acta Clin Croat* 1996;35:17-20
 - Glanz M, Klawansky S, Chalmers T. Biofeedback therapy in stroke rehabilitation, A review. *J Res Soc Med* 1997;90(1):33-39
 - Paran E, Amir M, Yaniv N. Evaluating the response of mild hypertensives to biofeedback-assisted relaxation using a mental stress test. *J Behav Ther Exp Psychiatry* 1996;27(2):157-167
 - Silver SM, Brooks A, Obenchain J. Treatment of Vietnam War veterans with PTSD; A comparison of eye movement desensitization and reprocessing, biofeedback, and relaxation training. *J Trauma Stress* 1995;8(2):337-342
 - Futterman AD, Shapiro D. A review of biofeedback for mental disorders. *Hosp Commun Psychiatry* 1986;37(1):27-33.
 - 오홍근. 긴장성 두통 환자의 EMG Biofeedback 적용을 위한 예비적 연구. *서울의대 신경정신학* 1985;10(3):236-240
 - 신행우. 확장기 혈압 바이오피드백 훈련과 혈압변화의 지시가 혈압조절에 미치는 효과. *한국심리학회지* 1987;6(2):22-34
 - 유영식, 기백석, 이재광, 박두병, 이철원. 불안장애 환자의 Biofeedback 치료에 관한 연구. *한국의과학* 1994;26(1):52-58
 - Hamilton M. The assessment of anxiety states by rating. *Br J Med Psychol* 1959;32:50
 - Crist DA, Rickard HC, Prentice-Dunn S, Barker H. The Relaxation Inventory, Self-report scale of relaxation training effects. *J Pers Assess* 1989;53:716-726
 - Crist DA, Rickard HC. A fair comparison of progressive and imaginal relaxation. *Percept Mot Skills* 1993;76:691-700
 - Adler CS, Adler SM. Biofeedback and Psychosomatic disorders. In, Biofeedback, Basmajian (eds), Baltimore, Williams and Wilkins; 1989. p.258-260
 - Stoyva JM. Autogenic training and biofeedback combined; A reliable method for the induction of general relaxation. In, Principles and Practice for Clinicians, Biofeedback, Basmajian (eds), Baltimore, Williams and Wilkins;1989. p.173-180
 - Basmajian JV. Principles and practice for clinicians. Biofeedback, Baltimore, Williams and Wilkins;1989. p.169-185
 - Nicassio PM, Boylan MB, McCabe TG. Progressive relaxation, EMG biofeedback and biofeedback placebo in the treatment of sleep-onset insomnia. *Br J Med Psychol* 1982;55:159-166

□ 부 록 □

이완 설문지

- 이완 훈련효과를 위한 자가 보고 설문지 -

■ 생리적 긴장상태 측정항목

1. .
2. 가 .
3. .
4. .
5. .
6. 가 .
7. .
8. .
9. .
10. .
11. .
12. 가 가 .
13. .
14. .
15. .

■ 인지적 긴장상태 측정항목

16. .
17. .
18. .
19. .
20. .
21. 가 .
22. .
23. 가 .
24. .
25. .

1=전혀 없다. 2=조금 있다. 3=보통이다. 4=많다. 5=아주 많다.