

BASELINE OCCUPATIONAL STRESS LEVELS AND PHYSIOLOGICAL RESPONSES TO A TWO DAY STRESS MANAGEMENT PROGRAM

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The benefits of work site stress management programs for a symptomatic employee populations remain to be established. The present study evaluated the physiological changes of a yoga based stress management program for 26 a symptomatic, male, middle managers. The Occupational Stress index (OSI) and autonomic parameters were measured. Data of subjects with OSI greater or less than the median were analyzed separately. The 't' test for paired data was used for pre-post comparisons. The whole group (n=26) showed a significant decrease in breath rate ($p < .005$) after the two day program, with no other changes. Subjects with OSI more than median ($n = 13$) showed a significant decrease in breath rate ($p < .01$), in the power of the low frequency component of the heart rate variability spectrum ($p < .05$), and in the low frequency: high frequency ratio (LF/ HF) ($p < .05$) and an increase in the high frequency component ($p < .05$) after the program, with no changes in the subjects with OSI less than the median.

Work related psychosocial stressors are known to affect the body functions through psychological processes, and influence health through four types of closely interrelated mechanisms-emotional, cognitive, behavioral, and physiological (Levi, 1990). The health outcome depends on situational (e.g., social support) and individual factors (e.g., personality, coping repertoire).

The increase in occupational stress has led to many work site stress management programs (Fiedler, Vivona - Vaughan, & Gochfeld, 1989), which have attempted to reduce workers stress. The efficacy of these procedures for a symptomatic employees has been questioned in the absence of recording of objective physiological changes.

The present study was conducted to evaluate psycho-physiological responses to a two day, yoga based stress management program, and to study psycho-physiological changes based on levels of occupational stress at baseline.

METHOD

Subjects

The subjects were 26 male volunteers who were attending a two day workshop on self-management for excessive tension through yoga. Their ages ranged from 34 - 54 yrs. (group average age = 43.0 ± 5.5 years), and none of them had previous experience of yoga or any relaxation procedures. All subjects were in the same occupation (middle managers from an electronic goods company) for at least two years prior to the test.

Design

Assessments were made at the beginning and at the end of the two-day workshop. During the polygraph assessments the subjects were seated in a dimly lit, sound attenuated room.

Assessments

The Occupational Stress Index (OSI) (Srivastava & Singh, 1981) was administered before the program. The OSI has 46 statements to which the participant had to respond with Yes or No. For

29 statements 'Yes' was scored as '1' and 'No' as '0', whereas for 17 statements it was the reverse, i.e., 'No' was scored as '1', and 'Yes' as '0'.

The following data were recorded using a 4-channel polygraph (Medicaid Systems, Chandigarh, India): (i) EKG was recorded using standard limb lead 1 configuration. The EKG was digitized using a 12 bit analog-to-digital converter (ADC) at a sampling rate of 500 Hz. The data recorded were visually inspected off-line and only noise free data were included for analysis (Raghuraj, Ramakrishnana, Nagendra, & Telles, 1998). The R waves were detected to obtain a point event series of successive R-R intervals, from which the beat to beat heart rate series was computed. Frequency domain analysis of heart rate variability (HRV) data was carried out for the 5-minute recordings. The mean heart rate was obtained from this record. The mean values were removed from the heart rate series to obtain the HRV values. The HRV power spectrum was obtained using Fast Fourier Transform (FFT). The power in HRV series in the following specific frequency bands was studied, viz., the very low frequency (VLF) band (0 - 0.05 Hz), low frequency (LF) band (0.05 - 0.15 Hz), and high frequency (HF) band (0.15 - 0.50 Hz). The low frequency and high frequency values were expressed as normalized units, which represent the relative value of each power component in proportion to the total power minus VLF component ($LF\ norm = LF / ((total\ power - VLF) \times 100)$; $HF\ norm = HF / ((total\ power - VLF) \times 100)$) (Task force of the European Society of Cardiology and the North American Society of Pacing and Electro-physiology, 1996). (ii) The breath rate (in cycles per minute) was calculated by counting the breath cycles in 60 second epochs, continuously. For each subject, the average of the values obtained during the 5-minute session was used for analysis..

Yoga practice

An idea from the traditional yoga texts that a combination of activating and pacifying practices may help reach mental equilibrium (Chinmayananda, 1984), was the basis for the main practice during the two-day program, called 'cyclic meditations'. It includes the practice of yoga postures interspersed with relaxation while supine, so as to have a combination of "activating" and "pacifying" practices (Nagendra & Nagarathna, 1997). Apart from the yoga practices the two-day stress management program also consists of a series of lectures (5 hours) on topics such as ancient Indian philosophical concepts about stress.

Data analysis

- (i) Pro-post stress management program comparisons were based on a t- test for paired data.
- (ii) The polygraph data of subjects with OSI greater than the median were analyzed separately from data of subjects with OSI less than the median. These data were also compared (pre-post) with the paired t- test.

RESULTS

The group means and SDs obtained in pre and post recordings are given in Table 1

Table 1 Mean \pm SDs of Autonomic Variables Pro-Post Recording Sessions in Groups with OSI less than or greater than Median

Parameter		Whole group (n = 26)		OSI < median (n = 13)		OSI > median (n = 13)	
		Pre	Post	Pre	Post	Pre	Post
Heart rate (bpm)	Mean	83.3	84.6	79.0	81.1	87.7	88.1
	\pm SD	12.9	11.9	12.0	10.7	12.7	12.4
Respiratory Rate (cpm)	Mean	17.4	16.3***	17.8	17.0	17.0	15.5**
	\pm SD	4.2	4.6	4.7	4.6	3.9	4.7
Low frequency (in nU)	Mean	35.0	34.3	36.2	36.4	34.8	31.3*
	\pm SD	6.6	9.6	8.7	12.3	4.2	6.2
High frequency (in nU)	Mean	64.9	65.6	63.5	63.5	65.1	68.6*
	\pm SD	6.6	9.6	8.9	12.3	4.2	6.2
LF / HF ratio	Mean	0.55	0.56	0.60	0.64	0.54	0.46*
	\pm SD	0.1	0.3	0.2	0.4	0.0	0.1
*P < .05, ** P < .01, ***P < .005, paired t test, 'post' compared to 'pre'							

The whole group (n=26) showed a significant decrease in breath rate after the two day program, with no other changes.

The polygraph data of subjects with OSI greater or less than the median (= 24.5) were analyzed separately. Subjects with OSI more than median (n = 13) showed a significant decrease in breath rate, in the power of the low frequency component of the heart rate variability spectrum, and in the low frequency; high frequency ratio (LF/HF). In these subjects the power of the high frequency component was significantly.

More after the program. In contrast, the subjects (n = 13) with OSI less than the median, showed no changes after the program.

There was no correlation between the OSI at baseline and polygraph measures (i) at baseline and (ii) recorded post compared with pre.

DISCUSSION

At the end of a two-day yoga based stress management program, the breath rate was lower, with no other change. However, when subjects were categorized based on their occupational stress index as OSI greater or less than the median, the two categories showed different trends. The 'OSI greater than the median' group showed a decrease in breath rate, also peak power of LF of the HRV, and LF/HF, with an increase in the HF peak power. The 'OSI less than the median' group showed no change.

In this study one of the main questions to be answered was whether the two-day stress management program would change objective measures in the symptomatic middle managers, who were participants. Apart from a decrease in breath frequency, there were no other objective signs of reduced physiological stress after the program. However, subjects with more than the median levels of the occupational stress index showed changes in the LF and HF components

of the HRV spectrum. The LF component is known to correspond to sympathetic and HF to vago-sympathetic activity of the ANS (Mililani et al., 1991). Subjects with high occupational stress scores at baseline appeared to be more likely to show reduced sympathetic activity after the two-day program. These results are in keeping with those of a previous study, which described that subjects with higher initial arousal and inability to focus attention showed better physiological rest after isometric squeeze relaxation, rather than meditation (Weinstein & Smith, 1992). Hence the results suggest that following a two-day yoga based stress management program subjects with higher levels of occupational stress, who do not necessarily show raised sympathetic arousal at baseline, show significant reductions in sympathetic activity.

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