REDUCTION IN METABOLIC RATE DURING THE PRACTICE OF THE TRANSCENDENTAL MEDITATION TECHNIQUE

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Presented at the first Canadian Congress for Multidisciplinary Study of Sport and Physical Activity, Quebec, Canada, October 1973.

Metabolic rate and tidal volume decreased during the practice of the Transcendental Meditation technique. —EDITORS

A comparison was made of changes in metabolic rate during the Transcendental Meditation technique (N = 7) and during supine rest (N = 7). Oxygen consumption dropped 15.5 percent during Transcendental Meditation, but only 3.5 percent during rest. Both changes were statistically significant ($p < .001$). An analysis of covariance indicated that the drop in oxygen consumption during the Transcendental Meditation technique was significantly larger than that occurring during rest ($p < .001$). Moreover, tidal volume decreased significantly during Transcendental Meditation ($p < .001$), whereas it increased significantly during rest ($p < .005$). Respiratory quotient remained constant during both Transcendental Meditation and rest. Therefore, during the Transcendental Meditation technique a significantly larger drop in metabolic rate occurred than during simple rest.

INTRODUCTION

A significant decrease in metabolic rate has been reported to result from the practice of the Transcendental Meditation (TM) technique (1). Wallace, Benson, and Wilson found that oxygen consumption dropped an average of 17 percent during a 20-minute period of TM. The purpose of this study was to investigate the effect on metabolic rate of the TM technique compared with resting in a supine position. It was hypothesized that the TM technique would bring about a significantly larger reduction in metabolic rate than simply lying down and resting.

METHOD

Fourteen male undergraduates at the University of Alberta took part in the study. Seven subjects who had been practicing the Transcendental Meditation technique for at least 12 weeks composed the experimental group, and seven others who were not practicing TM served as the control group.

All subjects were tested between four and six P.M. On arrival in the testing room the subject was asked to sit in a chair and rest for 15 minutes. Immediately following this a five-minute expired gases sample was collected. This was used to determine oxygen consumption, tidal volume (TV), and respiratory quotient (RQ). During this same period the heart rate (HR) and respiratory rate (RR) were checked and recorded. A second five-minute sample of expired gases was collected after 15 minutes of meditating (among subjects in the TM group) or after 15 minutes of resting in a supine position (among subjects in the control group). RR and HR were recorded again at this time. A verbal check was made at the end of the 15-minute period to ascertain that the subject was not asleep. Prior to the collection of any data, the subjects were provided with an opportunity for a trial participation in the test.

RESULTS

Table 1 and fig. 1 present the mean oxygen consumption for the TM and rest groups before and after 15 minutes of the treatment. Oxygen consumption declined significantly ($p < .001$) during the practice of TM, dropping 15.5 percent, which is comparable to the 17 percent drop found by Wallace, Benson, and Wilson. Oxygen consumption also declined significantly during rest, dropping a mean of 3.5 percent ($p < .001$). An analysis of covariance showed that oxygen consumption dropped significantly more during TM than during rest ($p < .001$). Table 2 shows that the respiratory quotient remained essentially constant at about 0.85 throughout all tests for both groups. The reduced oxygen consumption along with an unchanging respiratory quotient indicates that metabolic rate declined significantly during TM and that

TABLE 1

OXYGEN CONSUMPTION BEFORE AND AFTER A FIFTEEN-MINUTE TREATMENT PERIOD

TREATMENT	N	BEFORE		AFTER		t	p
		Mean (ml/min)	S.D.	Mean (ml/min)	S.D.		
TM	7	257.0	17.4	216.9	12.0	13.06	<0.001
Rest	7	275.0	22.4	265.3	21.2	10.71	<0.001

NOTE: Analysis of covariance comparing changes brought about by TM with those brought about by rest yielded: $F = 55.42$, $p < 0.001$.

TABLE 2

RESPIRATORY QUOTIENT (RQ) BEFORE AND AFTER A FIFTEEN-MINUTE TREATMENT PERIOD

TREATMENT	N	BEFORE		AFTER	
		Mean RQ	S.D.	Mean RQ	S.D.
TM	7	0.85	0.01	0.85	0.02
Rest	7	0.85	0.02	0.84	0.01

TABLE 3

TIDAL VOLUME (TV) BEFORE AND AFTER A FIFTEEN-MINUTE TREATMENT PERIOD

TREATMENT	N	BEFORE		AFTER		t	p
		Mean TV (ml)	S.D.	Mean TV (ml)	S.D.		
TM	7	500	18	444	40	13.61	<0.001
Rest	7	439	46	494	39	-4.36	<0.005

NOTE: Analysis of covariance comparing changes brought about by TM with those brought about by rest yielded: $F = 7.07$, $p < 0.05$.

this drop was much greater than the decline in metabolic rate resulting from simply resting in a supine position.

Table 3 and fig. 2 show that tidal volume decreased significantly ($p < .001$) during TM and increased significantly during rest ($p < .005$). This difference in changes in tidal volume between the TM and the rest group is significant ($p < .05$). Respiratory rate, shown in table 4, declined significantly in both groups. Therefore, it appears that during TM slower, shallower breathing occurs, while during rest slower, deeper breathing occurs. Table 5 shows that heart rate declined significantly in both groups and that these changes were not significantly different between the two groups.

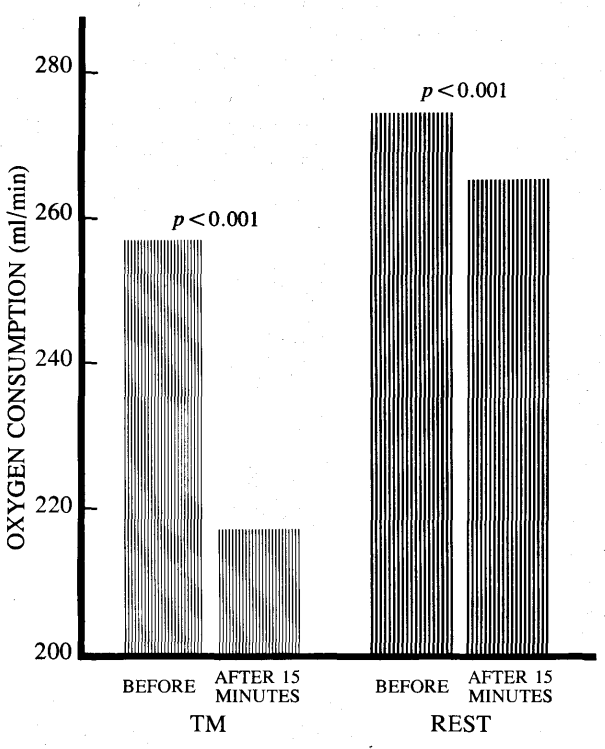

FIG. 1. CHANGES IN OXYGEN CONSUMPTION OVER THE 15-MINUTE EXPERIMENTAL PERIOD. Oxygen consumption declined significantly more during TM than during rest.

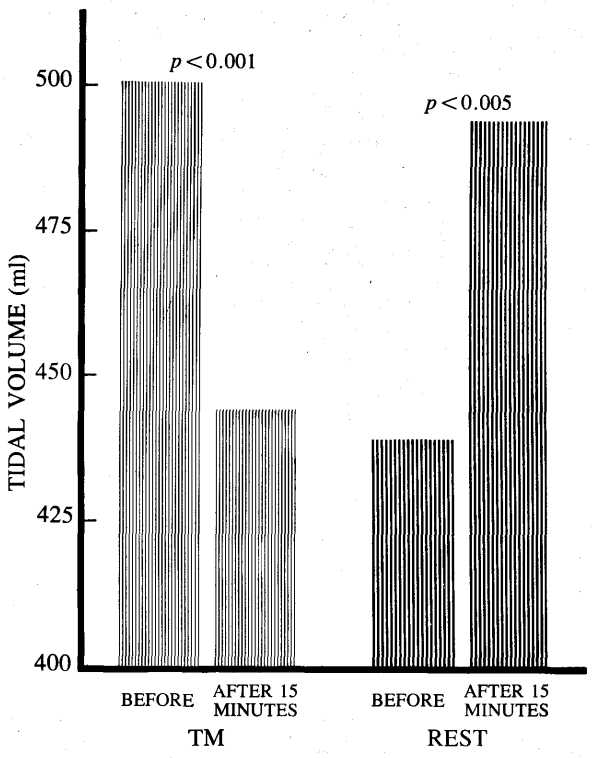

FIG. 2. CHANGES IN TIDAL VOLUME OVER THE 15-MINUTE EXPERIMENTAL PERIOD. Tidal volume decreased significantly during TM, whereas it increased significantly during rest.

TABLE 4

RESPIRATORY RATE (RR) BEFORE AND AFTER A FIFTEEN-MINUTE TREATMENT PERIOD

TREATMENT	N	BEFORE		AFTER		t	p
		Mean RR (breaths/min)	S.D.	Mean RR (breaths/min)	S.D.		
TM	7	10.7	1.1	8.1	1.0	5.35	<0.002
Rest	7	12.6	1.8	11.0	1.2	4.26	<0.006

NOTE: Analysis of covariance revealed no significant differences in changes between the TM and control groups.

TABLE 5

HEART RATE (HR) BEFORE AND AFTER A FIFTEEN-MINUTE TREATMENT PERIOD

TREATMENT	N	BEFORE		AFTER		t	p
		Mean HR (beats/min)	S.D.	Mean HR (beats/min)	S.D.		
TM	7	70.0	3.5	64.3	3.9	7.07	<0.001
Rest	7	73.1	3.8	68.9	3.5	3.38	<0.015

NOTE: Analysis of covariance revealed no significant difference in changes between the TM and control groups.

DISCUSSION

The changes in metabolic rate and breathing patterns occurring during the TM technique are significantly different from those resulting from resting in a supine position. TM produces a profound drop in metabolic rate accompanied by slow, shallow breathing, whereas rest produces a significant but small drop in metabolic rate accompanied by slow, deep breathing. These results confirm Wallace, Benson, and Wilson's (1) findings that the TM technique produces a unique physiological state, resulting in much deeper rest than that gained by simply lying down and closing the eyes.

REFERENCE

1. WALLACE, R. K.; BENSON, H.; and WILSON, A. F. 1971. A wakeful hypometabolic physiologic state. *American Journal of Physiology* 221: 795–799.