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Review of Controlled Research on the Transcendental Meditation Program and Cardiovascular Disease:

Risk Factors, Morbidity, and Mortality

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Abstract

Because of growing evidence for stress as a major factor contributing to cardiovascular disease (CVD), techniques of meditation are being increasingly used. The Transcendental Meditation (TM) technique is distinct from other techniques of meditation not only in its origin and procedure, but also in the amount and breadth of research testing it. Evidence for its ability to reduce traditional and novel risk factors for CVD includes: 1) decreases in blood pressure, 2) reduced use of tobacco and alcohol, 3) lowering of high cholesterol and lipid oxidation, and 4) decreased psychosocial stress. Changes expected to result from reducing these risk factors, namely, reversal of atherosclerosis, reduction of myocardial ischemia and left ventricular hypertrophy, reduced health insurance claims for CVD, and reduced mortality, also have been found with TM practice. Research on mechanisms suggests that some of the CVD-related benefits as a result of this technique could arise from normalization of neuroendocrine systems whose function has been distorted by chronic stress. Further randomized clinical trials are in progress with a focus on underserved minority populations.

Keywords

complementary and alternative medicine; cardiovascular disease; psychosocial stress; transcendental meditation

Current evidence indicates that psychosocial stress contributes to cardiovascular disease (CVD). Effects of stress are evident in each of the recognized mechanisms leading to cardiac events, namely, clustering of traditional risk factors, endothelial dysfunction, myocardial ischemia, plaque rupture, thrombosis, and malignant arrhythmias (see for review, reference1). Although a variety of stress reduction approaches are currently being applied to prevention and treatment of CVD, the Transcendental Meditation (TM) technique has been the most widely researched.2

Among the more than 600 published studies on the TM technique, many support its usefulness in preventing and treating CVD. As a result of space limitations, only the studies most directly related to CVD, and with the strongest experimental designs, are described in the next sections.

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CARDIOVASCULAR DISEASE RISK FACTORS

Blood Pressure

The first results of fully randomized clinical trials of the TM technique for hypertension were published in the mid-1990s.3,4 These results, after on dozens of studies demonstrating reduced substance use, reduced psychologic indicators of stress, and cross-sectional demonstrations of reduced blood pressure, were unambiguous. Three months of the TM program reduced both systolic and diastolic blood pressure in older blacks with hypertension. Reductions in the TM group were large (11 mm Hg for systolic and 6 mm Hg for diastolic) and highly statistically significant compared with a health education control. Blood pressure reductions by the TM technique were found in subjects of both sexes and in subjects at low risk as well as subjects at high risk (allocating by median split) on 6 indicators of hypertension risk: psychosocial stress, obesity, alcohol use, physical inactivity, dietary sodium–potassium ratio, and a composite measure of all these.4 Progressive muscle relaxation, another technique for stress reduction, also produced significant reductions compared with the health education controls, although these changes were significantly smaller than those obtained with TM.

Cigarette Smoking and Alcohol Use

All studies (as of 1993) of the effects of the TM program on cigarette smoking and use of alcohol or other addictive substances were combined in a statistical meta-analysis. The analysis covered a total of 4524 subjects, including adolescents, college students, working adults, elderly individuals, and even skid-row alcoholics.5 The effect size for the TM technique on cigarette use was .87 ($P = 0.00003$). Effect sizes for use of alcohol and drugs were slightly smaller, but remained highly significant. The strength of the experimental design was controlled for in the analysis.

Cholesterol Levels and Lipid Oxidation

A controlled trial of the TM program for hypercholesterolemia, in subjects whose serum level was at least 200 mg/dL but who had no history of heart, renal, or thyroid disorders and were not on medication, showed a significant reduction in fasting serum cholesterol after 11 months of TM practice.6 An observational study found that TM program practitioners had significantly lower lipid peroxide levels than controls matched for age and gender.7 Lipid peroxides reflect the degree of exposure to free radicals and correlate with oxidized cholesterol, a component of arterial plaque.

Psychosocial Stress

Because of the large number of studies of TM effects on psychosocial stress, metaanalyses again could be the most accurate indicators of relative effectiveness. One of the largest of these examined all studies that could be located for stress reduction and trait anxiety (146 independent outcomes).8 The effect size for TM (.70) was significantly greater than for “other types of meditation,” progressive relaxation, and other relaxation techniques.

Other metaanalyses have examined indicators of positive psychologic health. For example, Alexander et al.9 examined 42 treatment outcomes for self-actualization, a widely used indicator of comprehensive psychologic health. The effect size for TM (.78) was 3 times as large as for other forms of meditation lumped together (.26) as well as for relaxation techniques (.27). Similar results were obtained for positive psychologic outcomes such as self-concept and internal locus of control and negative psychologic measures (eg, depression, anger, hostility) in a metaanalysis of heavy abusers of alcohol and other substances.5

MORBIDITY AND MORTALITY

In general, CVD morbidity and mortality are proportional to the number and severity of CVD risk factors. With the effects on risk factors that the TM program appears to have, the technique would be expected to reduce CVD morbidity and mortality as well. Evidence from initial studies appears to uphold the results on risk factors, with confirming studies on atherosclerosis, myocardial ischemia, left ventricular hypertrophy, health insurance claims, and mortality.

Atherosclerosis

Perhaps the most striking evidence to date that the TM technique not only reduces risk factors, but actually reduces CVD morbidity and mortality, is the reduction of atherosclerosis. The 2 studies completed to date (both randomized, controlled trials) examined carotid artery intima–media thickness, a noninvasive measure of peripheral atherosclerosis and surrogate measure of coronary artery atherosclerosis. Both reported reductions in atherosclerosis. One was in inner-city blacks with hypertension,10 whereas the other was in older white Americans.11 The latter also included 3 additional treatment modalities from a traditional system of health care, Maharishi Vedic Medicine, and perhaps because of these added modalities, showed larger reductions in atherosclerosis than those found for the TM technique alone. In the latter study, a subgroup of subjects with 2 or more risk factors for cardiovascular disease showed a reduction in atherosclerosis that would be expected to reduce the likelihood of a heart attack or stroke by 33% after only 1 year of this intervention. Treatment with TM alone reduced likelihood of heart attack or stroke by 11% after 8 months in the study of blacks with hypertension.

Myocardial Ischemia and Left Ventricular Hypertrophy

Further studies found beneficial effects of the TM program on ischemia and left ventricular hypertrophy. The ischemia study was in patients with preexisting coronary artery disease.12 Compared with control subjects, patients with coronary artery disease who learned TM and practiced for 8 months showed greater exercise tolerance, higher maximal workload, delayed onset of ST-segment depression, and a decrease in double product at each exercise interval. Supporting results were obtained in a similar pilot study of patients with cardiac syndrome X. 13 The left ventricular hypertrophy study was conducted in blacks with hypertension and showed that 1 year of practicing the TM program reduced left ventricular hypertrophy by 10%. 14

Reduced Health Insurance Claims

Results of the 2 studies on the use of health insurance by practitioners of the TM program also are consistent with reduced CVD. The first study, comparing 5 years of claims by 2000 TM practitioners with claims for the entire database, found 87% fewer inpatient and outpatient admissions for CVD in the TM group.15 A second study found similar results, although subjects in this study were also using alternative medicine approaches in addition to TM. Nondisease-related admissions (childbirth, for example) were the same for the 2 groups, suggesting that the TM group had not reduced its insurance use because of a change in philosophy concerning medical care.

The possibility that reduced insurance claims arise because individuals who choose to learn and practice the TM program are healthier at the outset appears unlikely. Studies in which the subjects' use of medical doctors was monitored for 3 years before and several years after learning the TM program found no difference from control subjects and no trend over time before learning TM, but a continual decline overtime after learning this program.16,17

Mortality

The first randomized, prospective study of the effects of the TM program on mortality was in a group of volunteer subjects in rest homes for the elderly.18 The majority (82%) of these subjects (average age at outset was 81 years) had high normal blood pressure or stage 1 hypertension. After 1 year, the TM group showed significantly greater improvements in several measures of quality of life and in blood pressure than the comparison groups. After 3 years, the number surviving in the TM group was significantly higher than for the usual care control group and the relaxation–response group. In a 15-year follow up of this study, the TM group showed lower CVD mortality rate than the combined control subjects, adjusting for age, gender, and pretest systolic blood pressure.19 More recently, in the only other known study on TM and mortality, a metaanalysis combining all 77 subjects from the previously mentioned study on rest home residents and all 125 subjects from the first randomized study on older subjects with hypertension found a highly significant reduction in all-cause mortality and a strong trend toward reduction of CVD mortality ($P = 0.056$) in the TM group compared with the active-treatment and usual-care control subjects combined.20

PRACTICE, THEORY, AND MECHANISM OF EFFECTS OF THE TM PROGRAM

The TM technique was introduced to the West by Maharishi Mahesh Yogi, a scholar of the ancient Vedic tradition of India.21 It is a simple, psychophysiological procedure practiced for 20 minutes twice a day. Although it can result in changing lifestyle preferences, no particular changes or beliefs are required. It is taught by specially trained instructors and can be practiced in conjunction with most conventional medical treatments.

During the practice, a reduction in mental and physical activity occurs as a result of experience of a state called “transcendental consciousness,” which is different from usual waking, dreaming, or sleep states.22,23 This experience is thought to be responsible for the “normalization,” that is, restoration of normal function, of various systems in the body, particularly those involved in adapting to environmental “stressors” or challenges. This process and the TM practice itself are effortless, not involving concentration, contemplation, mind control, or visualization.

Practice of the TM technique has beneficial effects even in apparently healthy individuals. In view of the origins and theoretical conception of this technique, this is not surprising.24 In the Vedic tradition from which the technique derives, the intellectual understanding of both subjective and objective realms is deep and, in important ways, more complete than that of modern science.

The TM technique is not intended primarily as a treatment of disease, but rather as a means of enhancing growth of human awareness to its highest state. To understand the mechanism of effects of the technique, one needs to understand the Vedic perspective on higher states of consciousness.24,25 Higher states do not preclude experiences of the usual waking, dreaming, and sleeping states, but, nevertheless, are characterized by physiological and mental phenomena distinct from these. Evidence of the reality of these higher states includes descriptions in the Vedic literature, personal reports of practitioners of the TM program, and a growing body of empiric studies, all of which indicate these states confer greater abilities for successful interactions with internal and external environments.9,22,23,25–27

The ability of the TM technique to reduce the risk for CVD is probably most directly related to its ability to lower psychosocial stress and to correct deleterious effects of stress. Evidence supporting these effects and the restoration of adaptive mechanisms by this technique is more than suggestive.28–32 Adaptive mechanisms involving the autonomic nervous system, neuroendocrine axes, and the cardiovascular and immune systems are responsible for

maintaining a stable and efficient functional state of the physiology through the changing conditions of life.33–35 These mechanisms are altered by psychosocial stress in ways that decrease their ability to foster effective adaptation, and this appears to cause both physical and mental declines.

From the perspective of the Vedic tradition, including Maharishi Vedic Medicine (see the "Conclusion"), it is the inner intelligence of the body that maintains optimal mental and physical functioning in life.36 The ability of the TM technique to restore normal functioning of adaptive mechanisms is consistent with this Vedic understanding.

CONCLUSION: TM, MAHARISHI VEDIC MEDICINE, AND CARDIOVASCULAR DISEASE HEALTH

From a broader healthcare perspective, the TM technique is the central component of "Maharishi Vedic Medicine," a time-tested, prevention-oriented, natural system of health care. Maharishi Vedic Medicine is a comprehensive system that includes approaches based on all 40 branches of the Vedic literature, including Ayurveda.36–39 Several other institutions around the world that are patterned after theCollege of Maharishi Vedic Medicine in Fairfield, Iowa, are now offering training in this field.

Techniques of meditation and relaxation available today have a variety of sources, from ancient traditions to the modern clinic. Many of these could be useful for clinical conditions, but confusion exists because of insufficient attention to differences among techniques, including widely different degrees of effectiveness.

The prevalence of differential effectiveness among various meditation and relaxation techniques is not widely known, despite the results of hundreds of studies supporting marked differences.40 An overview of 10 metaanalyses covering 475 studies found that approaches based on long traditions outperformed the newer, clinically derived ones on most measures, even though the latter tend to be patterned after the former.40 Accumulated research now suggests that such variations in effectiveness are a major source of error in medical practice.

Perhaps largely as a result of the ability of the TM program to reduce the longlasting effects of stress, the program is clearly useful in the prevention and treatment of CVD. The results of ongoing studies will further clarify the extent of its usefulness. However, because of the wide variety of promising research already available, it seems appropriate that TM is considered a leading component of "mind– body medicine."41 Its applicability for CVD in high-risk, under-served populations is strongly supported,42 and although not yet directly tested, its cost-effectiveness for CVD is likely to be highly competitive with modern drug-based and surgical approaches.

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