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Effective Use of Meditation as an Intervention to Cardiovascular Disease

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By

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Background

Attention has long been paid to the mysterious nature of the mind's impact on physiologic function. This has been central to medicine whether disseminated as anecdotal and cliché in nature or founded in science. Interest has been increasing as patients and providers alike become fascinated with integration of western and eastern approaches to medicine. Diet and exercise are consistent components of clinician mantra. Recently though, integrated terms like mindful meditation, yoga, and spiritual healing are growing in popularity and reframing lifestyle change interventions. These terms will be collectively referred to as mind-body exercises (MBE), unless any distinction is necessary.

Heart disease has been the leading cause of death for nearly one hundred years in the United States despite large efforts from healthcare providers to educate, prevent, and treat cardiovascular diseases (CVD).[1,2] Diet and exercise have been implemented as first line therapy to improve cardiovascular health, prevent CVD, treat hypertension, and improve blood cholesterol values. The second approach is utilizing an arsenal of medications with varying efficacy and side effect profiles. As alternative medicine has become more popular, patients are becoming increasingly skeptical of these medications. At the same time compelling evidence for non-pharmaceutical options outside of dietary modification and physical fitness is growing. Studies show a strong link between MBE and improving cardiovascular measures**.** The goal of this literature review is to elucidate what parameters are most susceptible to MBEs, how those parameters can be modified to reduce CVD risk, and how the knowledgeable clinician can utilize MBEs to optimize patient-centered care. This review will demonstrate a judicious clinical approach to interpreting current recommendations for treating CVD patients and understanding

what about the current model can be improved upon and what patient demographics should be considered when prescribing MBE.

Discussion

The mind has an immense impact on objective measures related to cardiac function, stress levels, and autonomic nervous system function. Cardiac measures that most reliably predict CVD include hypertension, hyperlipidemia, and smoking.[3]

Hypertension

Review of Systolic Blood Pressure Intervention Trials (SPRINT) shows that normal blood pressure can be considered a systolic blood pressure (SBP) less than or equal to 120. Hypertension is universally accepted as an indirect measure of cardiac function and risk for adverse outcomes. In addition, SPRINT studies demonstrate that an increase in SBP above normal is correlated with heart failure and higher mortality.[4] Therefore, there is a large incentive to reduce patients' SBP to a normal level to improve cardiac function, decrease heart failure and decrease mortality due to CVD.[5]

First-line treatment for high blood pressure begins with life-style changes but review of the literature shows that most patients are started on pharmacotherapy and end up on multiple-drug regimens to achieve adequate control.[6] The importance of implementing lifestyle changes is often glossed over and in practice is often mentioned only briefly, or not at all.

Realistically, there is a lot of potential for lowering blood pressure with MBE. Although limited to a small sample size, one randomized control study analyzing yoga as an intervention in hypertensive patients showed decrease in blood pressure compared to control.[7,8] Many studies determine the same trend but neglect to compare this to pharmacotherapy in terms of efficacy.[9]

Without comparative studies pharmacotherapy introduces variables of concern to patients such as adverse reactions, non-compliant exacerbations, or even a false understanding that medication has treated their high blood pressure. These can be minimized with proper education.

One meta-analysis notes variable response to different MBEs. Notably more significant decreases in blood pressure were seen in patients less than sixty years old when using a high cardiovascular demand MBE like high intensity yoga. Contrast this with patients greater than 60 years old that respond more effectively to mindfulness and more breathing exercise-based forms of meditation.[10] Criticism from most reliable sources like the American Heart Association meta-analysis like these primarily focus on the sample size and high drop-out rates of individual studies.[8]

Drawbacks in terms of the literature do not consider the practical benefits of MBE. Low cost and improved sense of well-being are most difficult to put into scientific terms but may be at the forefront of reasons to implement these options with patients over or concurrent with pharmacotherapy.

Dyslipidemia and Atherosclerosis

Hyperlipidemia and atherosclerosis contribute significantly to CVD risk.[3] Lipid profiles are commonly measured in outpatient settings in order to stratify patients into vulnerability to develop CVD or ischemic and thrombotic events, and therefore is an important variable to consider when examining MBEs. The current literature demonstrates that MBEs are not as straight forward in their impact on dyslipidemia. In a study comparing meditation to exercise on a large number of measures shows that exercise is more effective at lowering blood markers such as LDL and fasting blood sugar and improving HDL levels. Silent and akinetic versions of MBE, like meditation have better outcomes related to pain, altruism, and anxiety.[11] MBEs that have

higher oxygen demand have effects more related to exercise. Yoga, for example, which requires participants to maintain positions with significantly active muscle tone compared to relaxation-type meditation, has a remarkably beneficial impact on increasing HDL and decreasing LDL and triglycerides.[12] The implication of this difference between high oxygen demand MBE and akinetic versions is a requirement of the clinician to work with patients to prioritize patient goals. There is a lot of ability for a clinician to individualize intervention when using MBE modalities.

Central Nervous System

MBE can also be used in various other capacities that relate to CVD. Stress is a daily occurrence for most people, and it has a notable contribution to CVD risk factors. Autonomic nervous system (ANS) balance is a big indicator of how susceptible to someone is to stress related illness. Robert Sapolsky, a professor of biological science at Stanford University and professor of neurology and neurosurgery at Stanford's School of Medicine elucidates that the patient with chronic stress decreases parasympathetic tone and worsens cardiovascular measures.[13] With pathologically less parasympathetic tone due to stress, increases in heart rate and blood pressure lead to CVD as previously discussed. Studies have shown that the mechanism of this autonomic nervous system pathology can be reversed with decreasing stress. One of these is examples is seen in former drug addicts. Heavy substance abuse causes remarkable stress on the body and blunts the nervous system's ability to display parasympathetic tone. Pathological stress and overactive sympathetic nervous system (SNS) over parasympathetic nervous system (PNS) was shown to be reversed in a trial with ex-drug addicts practicing Zen yoga.[14] It can be said then, that MBEs improves the responsiveness and contrast between parasympathetic tone and sympathetic tone.

MBEs have an impact on mental measures of patient health. Optimizing vagus nerve stimulation due to improved ANS function in chronically stressed individuals can improve patients' perceptions of their own illnesses, build better rapport with healthcare providers, and predict higher compliance rates with treatment plans.[15] This means ANS function can improve CVD by directly stimulating PNS and can indirectly improve by improving compliance to pharmacotherapy and patient follow up associated with CVD. Additional research shows a correlation with lower burnout rates in high demand occupations.[16] This array of improvement for patients is especially a consideration for primary care providers emphasizing prevention and taking a wholistic approach to patient care.

The clinician must also consider patient demographics associated with use of MBE. A study analyzing women diagnosed with breast cancer showed that women of higher education and more recent diagnosis were more likely to use MBE in place of or in conjunction with other therapy.[17] Judicious use of assessing patient buy-in to MBE can optimize efficacy and improve patient outcomes. This is especially important to consider if newly diagnosing patients with CVD risk factors or CVD since this may improve patient motivation for MBE as a therapy.

Conclusion

MBE has been shown to reduce blood pressure, improve lipid profiles, and autonomic nervous system function related to stress. Most studies demonstrating these valuable points are limited in size and therefore may lack generalizability. More research needs to be done to support or refute current research. There is a lack of studies directly comparing MBE to pharmacotherapy in terms of efficacy. Other variables may also be considered, such as inflammatory markers and mortality in patients practicing MBE. Positive implications on

compliance of other therapeutics and general patient motivation should be considered when suggesting MBE. Factors regarding patient demographics such as education level, age, and recent diagnoses must be carefully understood for prudent use of MBE in adjunct with pharmacotherapy. The variety of MBE modalities also allow the patient and clinician to personalize the use of MBE to target desired metabolic measures, such as blood pressure and lipid profiles or improve mental health, such as anxiety and pain.

It appears that in line with most clinical interventions MBE should not be a monotherapy and there are variables that make the provider prescribing MBE more appropriate. MBE is another effective tool in the quiver of a well-rounded clinician.

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