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Effect of heartfulness meditation on burnout, emotional wellness, and telomere length in health care professionals

Jayaram Thimmapuram[a], Robert Pargament[a], Kedesha Sibliss[a], Rodney Grim[b], Rosana Risques[c] and Erik Toorens[d]

[a]Internal Medicine Department, Wellspan York Hospital, York, PA, USA; [b]Research Scientist, Wellspan York Hospital, York, PA, USA; [c]Department of Pathology, University of Washington, Seattle, WA; [d]Lab Manager for DNA Sequencing, Penn Genomic Analysis Core, University of Pennsylvania, Philadelphia, PA, USA

ABSTRACT

Background: Burnout poses significant challenges during training years in residency and later in the career. Meditation is a tool to treat stress-related conditions and promote wellness. Telomere length may be affected by burnout and stress. However, the benefits of meditation have not been fully demonstrated in health care professionals.

Objective: We assessed the effects of a 12-week 'Heartfulness Meditation' program on burnout, emotional wellness, and telomere length in residents, faculty members, and nurses at a large community teaching hospital during the 2015–16 academic year.

Methods: All subjects completed a baseline Maslach Burnout Inventory (MBI) and Emotional Wellness Assessment (EWA) at the beginning of the study. Meditators received instructions in Heartfulness Meditation. At week 12, subjects completed a follow up MBI and EWA scores. Salivary telomere length was measured at baseline and week 12.

Results: Twenty-seven out of a total 155 residents (17.4%) along with eight faculty physicians and 12 nurses participated in the study. Thirty-five enrolled as meditators and 12 as controls. At 12 weeks, the meditators had statistically significant improvement in all measures of burnout and in nearly all attributes of EWA. Controls showed no statistically significant changes in either burnout or emotional wellness scores. Relative telomere length increased with statistical significance in a younger subset of meditators.

Conclusion: Our results indicate that meditation offers an accessible and efficient method by which physician and nurse burnout can be ameliorated and wellness can be enhanced. The increased telomere length is an interesting finding but needs to be confirmed with further research.

Abbreviations: EWA: Emotional wellness assessment; MBI: Maslach burnout inventory; EE: Emotional exhaustion; DP: Depersonalization; PA: Personal accomplishment; PI: Prinicipal investigator; JT: Jayaram Thimmapuram

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1. Introduction

Modern medicine is fraught with difficult circumstances and often requires its practitioners to make difficult decisions with limited information. Healthcare workers' exposure to excessive occupational stress can lead to significant negative consequences over time including mental distress, psychiatric issues and burnout [1]. Burnout is a psychological syndrome that develops in response to prolonged occupational stress and depletion of personal coping resources, resulting in emotional exhaustion, depersonalization and a reduced sense of personal accomplishment [2]. It has been associated with multiple undesirable outcomes, including absenteeism, high employee turnover and decreased job satisfaction [3–5]. The most widely used tool for measuring burnout is the Maslach Burnout Inventory (MBI), which has been validated for multiple populations [5,6].

Rates of burnout in healthcare have been shown to be a significant problem, not only for physicians, but for nurses as well [7–11]. Resident physicians are particularly vulnerable to burnout because of the grueling clinical demands, educational pressures, and sleep deprivation associated with training [11–13]. Residents suffering from burnout often report difficulty with clinical practice and a need to distance themselves from their patients [14,15]. Studies using MBI have estimated that between 18% and 76% of medical residents experience symptoms of burnout during training [7,16,17]. Researchers have concluded that educators should be actively aware of burnout and consider incorporating relevant instruction and interventions during residency training [18].

CONTACT Jayaram Thimmapuram jthimmapuram@wellspan.org Department of Internal Medicine, Wellspan York Hospital, 1001 S. George St, York, PA 17405, USA

In addition to more immediate psychological effects, work-related exhaustion has been correlated with accelerated biological aging, as indicated by shortening of leukocyte telomeres [19]. Telomeres are protective protein complexes at the end of chromosomes that promote chromosomal stability and protect chromosomes from cellular senescence [20]. Telomere length influences overall longevity and telomere shortening is a hallmark of molecular aging [21]. Psychological stress has been associated with accelerated telomere shortening in leukocytes, while meditation practices have shown to be associated with increased telomere length [22–24].

Physician wellness has been proposed as a potential tool to reduce burnout [25,26]. Wellness is defined as a dynamic and ongoing process involving self-awareness and healthy choices to achieve a successful lifestyle. This relies on balance between the physical, emotional, intellectual, social, and spiritual realms [27]. Meditation is a tool with great potential for reducing stress and improving wellness. Techniques such as yoga and meditation have been shown to decrease exhaustion, stress, fatigue, and burnout [28]. Heartfulness meditation is a simple heart-based meditation practice aimed at achieving a state of balance of mind. We hypothesize that this technique could assist participants in coping with work place stress, decrease burnout, improve emotional wellness and increase telomere length.

2. Objective

The study purpose was to evaluate the effects of heartfulness meditation on measures of burnout, emotional wellness, and telomere length in residents, faculty physicians and nurses.

2.1. Year of study

Academic year of 2015–2016.

3. Methods

3.1. Overview

The study was a prospective cohort trial comparing burnout and wellness outcomes, as well as changes in telomere length, over a 12-week period in physicians and nurses self-assigned to either participation in heartfulness meditation (intervention arm) or no particular intervention (control arm). The study was conducted at a large, 572-bed teaching hospital with multiple residency training programs and was approved by the institutional review board prior to enrollment.

Interest in participation was assessed via emails sent by the principal investigator (PI) to each resident and the nursing staff. Participation was voluntary, and subjects chose to participate in either the meditation or control arm following informed consent. Subjects with self-identified active psychiatric conditions were excluded from the study.

All the subjects filled out MBI forms, and an emotional wellness assessment form (EWA), developed by the PI, at baseline and week 12 of the study. Salivary samples for telomere analysis were collected from the subjects at baseline and week 12. For the purpose of this study, subjects with cancer or inflammatory conditions such as Rheumatoid arthritis and Lupus, which can affect telomere length irrespective of disease activity, were excluded from telomere length analysis.

The MBI is a validated test designed to assess the three primary dimensions of burnout: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA). Each of these dimensions was assigned a numerical score and further classified as indicative of low, moderate, or high level of burnout (Table 1).

The 'Emotional Wellness Assessment' (EWA) is a two-part survey tool developed by the PI to assess the impact of heartfulness meditation on emotional attributes. Section A contained questions regarding positive attributes, while section B contained questions pertaining to negative attributes (Table 2). Each section consisted of 11 questions that were rated on a scale of 1–10, with 1 representing the lowest level and 10 the highest.

Telomere length was measured using Oragene® Salivary kits (DNA, Genotek Inc., Canada). Subjects self-collected approximately 2 ml of saliva into a plastic collection kit. DNA was isolated in accordance with the product protocol. Telomere testing was performed at the Cytometry and Telomere Center, Department of Pathology, University of Washington by quantitative polymerase chain reaction (qPCR) using the method described by R. Cawthon [29]. Samples were run in triplicate, and the median value was used for calculations. The amount of telomeric DNA (T) was divided by the amount of single-copy control gene DNA (S), producing a relative, unit-less measurement of telomere length (T/S ratio). Laboratory staff were blinded to the group assignments of the subjects. Telomere analysis was performed according to age. Subjects with cancer, rheumatoid arthritis, or lupus were excluded from telomere analysis.

Table 1. MBI severity score.

	MBI Score severity		
	Low	Moderate	Severe
EE	0–16	17–26	27 or over
DP	0–6	7–12	13 or over
PA	39 or over	32–38	0–31

Table 2. EWA scores.

	Meditation (n = 35)			Control (n = 12)		
		Week			Week	
Attribute	Baseline	12	Sig.	Baseline	12	Sig.
Section A (Positive attributes)						
Calmness	5.57	7.83	.000	6.67	6.67	1.000
Clarity of goal	6.91	8.20	.001	7.67	8.00	.368
Concentration	6.51	8.14	.000	7.33	7.42	.754
Empathy	8.11	8.46	.136	8.25	8.08	.615
Harmony	7.63	8.29	.018	7.58	8.08	.166
Honesty to self	8.06	8.49	.020	7.83	8.42	.171
Joy	5.97	7.71	.000	7.33	7.00	.517
Positive thinking	6.69	8.14	.000	7.67	7.42	.643
Self confidence	7.00	8.14	.000	7.33	7.50	.787
Sleep	5.4	7.68	.000	6.83	6.66	.723
Tolerance	7.71	8.09	.191	7.83	7.83	1.000
Section B (Negative attributes)						
Addiction	2.91	2.09	.046	2.67	2.67	1.000
Anger	3.89	2.80	.008	3.08	2.58	.214
Anxiety	5.91	3.51	.000	5.00	4.33	.071
Apathy	3.46	2.26	.001	2.42	2.58	.754
Cynicism	3.94	2.63	.000	3.67	3.08	.430
Fear	3.86	2.77	.002	4.42	3.33	.053
Impulsiveness	3.09	2.29	.007	3.50	2.58	.272
Irritability	4.40	3.23	.000	4.17	3.42	.312
Jealousy	2.29	1.71	.013	2.42	2.08	.551
Sorrow	3.66	2.86	.050	3.00	2.58	.524
Stress	6.63	4.40	.000	5.42	4.92	.293

Sig. = significance

3.2. Data analysis

Basic descriptive statistics of the study groups were performed. Changes in MBI scores, EWA scores, and salivary telomere length between the meditation group and control group were analyzed by paired-sample t test. $\alpha < 0.05$ were considered statistically significant. Statistics were calculated using SPSS v.21 (IBM, Armonk, NY)

3.3. Intervention

All participants assigned to the meditation group received an overview of the study and instruction in the practice of heartfulness meditation from the PI (JT).

Heartfulness meditation practice asks participants to sit comfortably and gently focus their attention, with eyes closed, on the source of light within the heart. Rather than trying to visualize this, participants were asked to simply tune in to their hearts and be open to any experience that they may have. If their mind wanders, participants were advised to gently redirect toward the heart. This was recommended in the morning for 20 minutes and at night for five minutes before going to sleep. Participants were asked to use the same technique at least once per week in group meditation led by a heartfulness trainer (JT/Lavanya Karri) for 30 minutes.

An evening practice, lasting 15 minutes was recommended in which participants were asked to imagine that stress and heaviness ('impurities and complexities') were leaving the body through the back in the form of smoke or vapor. These impurities and complexities were to be replaced by a flow of purity, lightness, and freshness. Participants were asked to not dwell on those things they were expunging, but to simply brush them off.

A practice information sheet was distributed to each subject. Attendance was recorded for group meditation sessions. The PI sent a reminder email each week to all participants in the meditation group. The control group did not receive any interventions during the study period.

4. Results

Twenty-seven out of the 155 residents (17.4%) at our institution, along with eight faculty physicians and 12 nurses participated in the study.

Eighteen residents, 12 nurses, and five faculty members were in the meditation group. Nine residents and three faculty members were in the control group. Mean age in the meditation group was 38.1 years (age range 24–71 years) and 60% were female. Mean age in the control group was 31.5 (age range 24–45 years) and 50% were female. Average number of group sessions attended by participants was 6.5.

4.1. MBI results

At week 12, the meditation group had a statistically significant decrease in mean EE and DP scores (26.7–17.9, $p < .001$ and 11–7.3, $p < .001$, respectively). A statistically significant increase in PA score from 37.1 to 39.0 ($p = .018$) also was noted with no significant changes in any of these dimensions in the control group (Figure 1). Compared to the meditation group, the control group did exhibit slightly more favorable scores in all three categories of the MBI, but these differences were not statistically significant.

4.1.1. Resident burnout

4.1.1.1. MBI scores. Among residents in the meditation group (n = 18), there was a statistically significant decrease in the mean EE and DP scores (22.8–13.4, $p < .001$ and 10.6–6.9, $p = .007$, respectively). There was also a statistically significant increase in PA scores from 36.9 to 39.2, $p = .021$. In the resident control group (n = 9), there were no statistically significant changes in any category of the MBI (Figure 2).

4.2. EWA results

At week 12, there was a statistically significant change in 9 of the 11 attributes in section A and 10 of the 11 attributes in section B of the EWA in the meditation group. In the control group, no statistically significant changes were noted in any of the attributes of the EWA (Table 2).

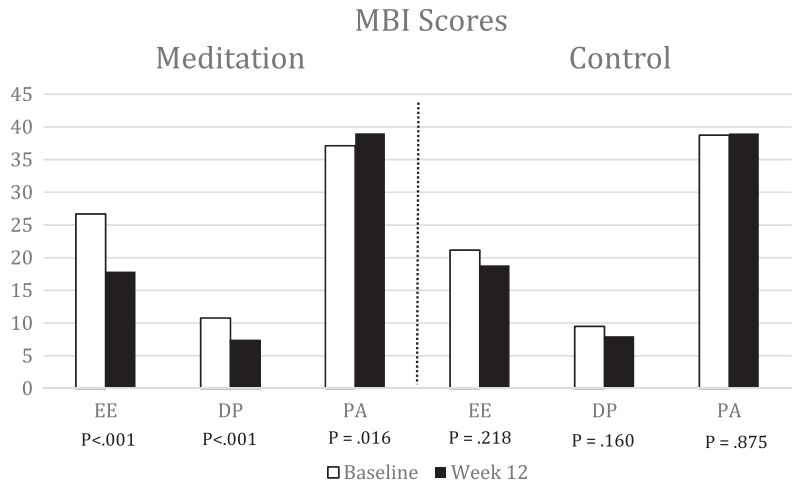

Figure 1. Overall MBI scores.

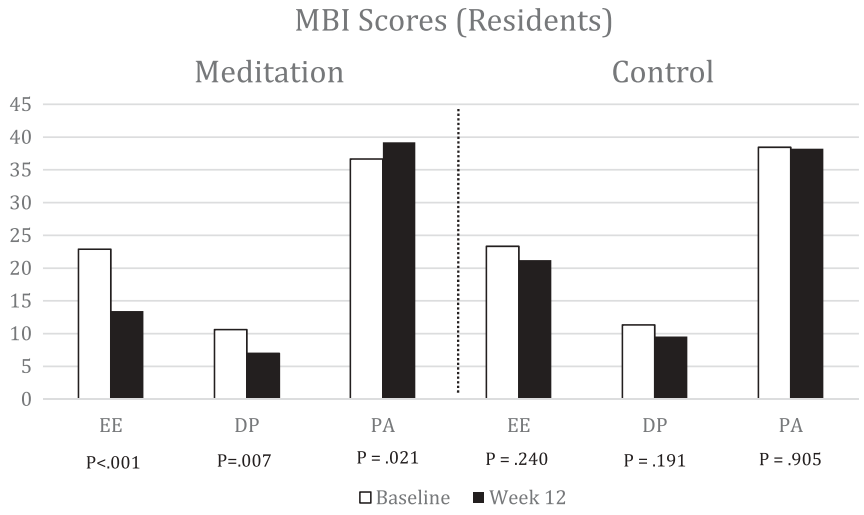

Figure 2. Resident MBI scores.

4.3. Telomere length results

Telomere analysis was performed according to age. The changes in telomere length according to age are shown in Figure 3. Overall, there was no statistically significant change in telomere length in either study group ($P = > .05$). However, in the subset of subjects aged 24–33 years, there was a statistically significant increase in telomere length in meditators ($P = .036$, n = 17). This result was not seen in age-matched controls ($P = .539$, n = 9) (Figure 4).

5. Discussion

Our results demonstrated improvements in measures of burnout and emotional wellness in healthcare providers participating in a structured heartfulness meditation program. Younger meditators had a significant increase in telomere length. The control group showed no significant changes in any of these parameters.

In the practicing physician population, studies have shown an improvement in physicians' burnout scores with mindfulness training [30,31]. However, literature on interventions for burnout in resident and nurses' populations remains scant. Though many of the studies using meditation practice as an intervention showed an improvement in burnout scores, some of the results have been inconclusive. The Respiratory One Method (ROM) demonstrated mixed results in family practice residents with a decrease in emotional exhaustion scores, but not depersonalization or personal accomplishment scores [32]. Studies on mindfulness-based resilience training in residents showed no significant short-term change in stress, burnout, or mindful-awareness [33].

The results of our study add to the body of literature supporting practices of meditation to help cope with burnout and improve emotional wellness in healthcare providers. Emotional factors, such as stress and anger have an impact on burnout [34,35]. However, a comprehensive tool to measure emotional wellness including positive and negative attributes is

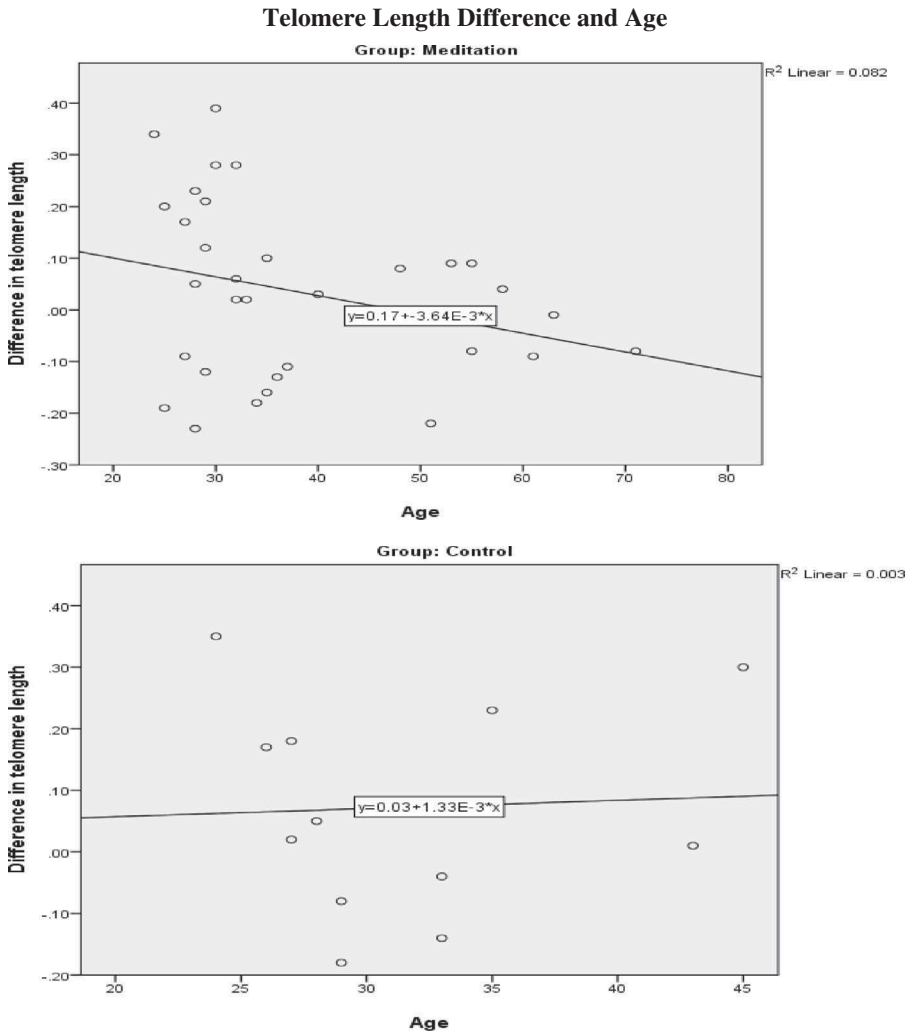

Figure 3. Telomere length difference and age.

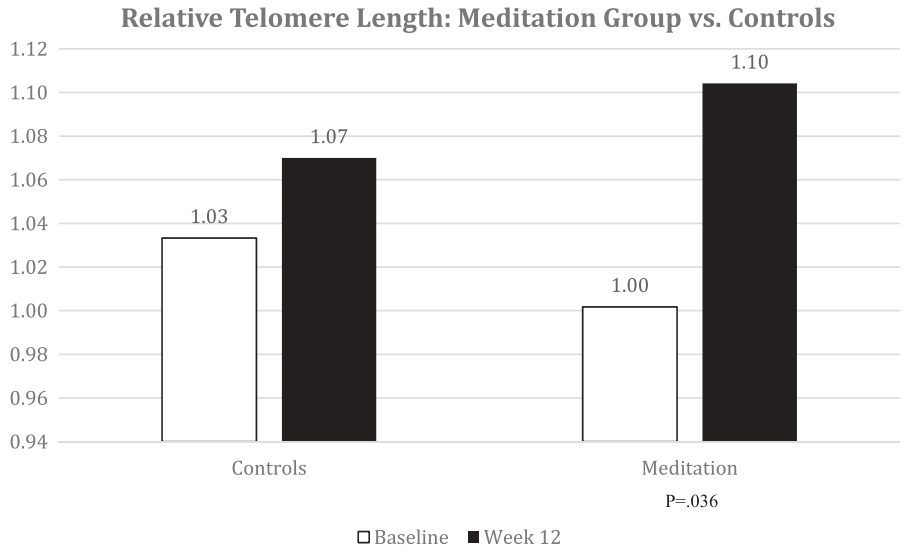

Figure 4. Relative telomere length aged 33 and under.

lacking. Therefore a subjective report scale of the positive and negative emotional attributes was used. Though the EWA questionnaire has not been formally validated, our study showed improved EWA scores in correlation with decreased burnout scores in the meditation group.

The increased telomere length in younger meditators is an interesting finding. Prior studies suggest

that telomerase activity declines with aging and telomere length is influenced by age [21,36,37]. Therefore the telomere length was analyzed according to age. This inherent decline in telomerase activity with age may explain why telomere length was more responsive to meditation in the younger group. Studies have shown a significant decrease of telomere length in patients with cancer [38,39]. Inflammatory conditions such as rheumatoid arthritis and systemic lupus erythematosus have been shown to effect telomere length irrespective of the disease activity [40,41]. Therefore these conditions were excluded from telomere analysis. While significantly increased telomerase activity has been reported following a three-month meditation retreat [42], our study demonstrated increased telomere length in a 'real-world' environment, where participants continued their usual activities and meditated for a shorter duration each day.

Our study is unique in that we used a non-invasive method to measure telomere length. To our knowledge, this is the first study on burnout measuring salivary telomere length in healthcare providers.

The heartfulness meditation program used in the study demonstrates potential to improve burnout and emotional wellness in healthcare providers. As residents constituted a majority in both groups, our results might be applicable to other residency programs. Instituting similar programs more widely might benefit health care organizations by reducing the turnover and absenteeism associated with burnout.

6. Limitations

Lack of randomization is a primary limitation of this study as participants self-enrolled into the group (meditation or control) of their choice. The control group was a no-treatment group with no alternative activity offered, making it difficult to assess for placebo effect. Lack of enrollment of nurses in the control group makes it more difficult to compare the groups. The sample size is small and comprised of healthcare providers at a single institution. We also cannot exclude the possibility of unknown sources of bias, including specific rotations, time of the year, and personal life factors of participants. Telomere analysis showed increase telomere length in the younger population, but we were unable to fully comment on telomere length change in the older population due to lack of a similar age group as controls. The Emotional Wellness Assessment form was unique to this study and has not been formally validated.

7. Conclusion

Heartfulness meditation was associated with significant improvement in all parameters of burnout and most attributes of emotional wellness in a small cohort of residents, faculty physicians, and nurses. There was also a statistically significant increase in salivary telomere length in the meditation group compared to the control group in ages 24–33 years. Further study is needed to confirm these findings.

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Disclosure statement

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