Effects of Heartfulness Meditation Practices on Control of Alzheimer's Disease: A Comprehensive Review

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Abstract

Background: Progressive stress levels, aging and less care on mental health among adults lead to a decline in neurophysiological functioning and diminish the performance of working memory. Regular practice of meditation through Heartfulness will enhance mental health and thereby considerably reduce the risks of Alzheimer's disease.

Methods: This review article was carried out from the literature available on databases such as PubMed, MEDLINE, Web of Science and Research Gate until May 2020. A qualitative analysis of the impact of Heartfulness meditation on people with chronic insomnia, students of different age groups, Heartfulness meditation practitioners and caregivers were summarized.

Results: From the survey results of selected 10 articles, it has been observed that the people who were practicing meditation through Heartfulness gain emotional wellness, joy, sound sleep pattern and reduction of stress, tension and anger. Moreover, the level of brain waves of the practitioners, especially alpha and delta activities in the brain were increased and there was a tremendous change in neuroplasticity among the practitioners.

Conclusion: Regular practice of meditation through Heartfulness improves the cognitive ability of the practitioners, with improved neurophysiological functions and suppresses the risks of Alzheimer's diseases.

Keywords: Alzheimer's disease; Heartfulness meditation; Qualitative research; Literature

Introduction

Alzheimer's disease (AD) leads to dementia among 70% of the cases and almost 10 million cases were reported every year as per the statistics of WHO (1). At present, almost 50 million people were affected by AD and fresh cases were being reported every 3 sec on an average (1). Despite decades of research, unique challenges in an appropriate cure for Alzheimer's exist because of its clinical characterization. "While the molecular causes of Alzheimer's are still debated, most neuroscientists believe that the disease begins when

the amyloid-beta begins to accumulate" (2). The initial phase of AD is the accumulation of amyloid plaques in our brains. At a younger age, we could be sure of this through a PET scan, because at this point, we were blissfully unaware of symptoms since, they will not show any impairment in memory, language, or cognitive (3).

Cognitive impairments were observed among older adults when they were subjected to a periodically stressed situation, and it also leads to a negative impact on the performance of working

memory (4). Emotional swings of day-to-day conventional activities were also a reason for diminishing memory performance, but the positive emotions among older adults stimulate and enhance their memory (5). The working memory also considerably gets degraded due to sleep deprivation (6).

Even though the causes of Alzheimer's disease are still a debate among researchers and medical practitioners, most specialists have highlighted their contributing risk factors (7). There is also an emerging category of research that contends regular practice of meditation would decline the risk factors leading to AD (8, 9). While dealing with Alzheimer-affected patients, the self-efficacy and resilience of the caregivers were highly improved when they practice meditation by reporting for at least 75% of meditation classes (10). Older adults, those who have a regular practice of meditation have better neurophysiological functioning and better enhancement in their working memory (11).

The present review re-examines the appropriate impact of Heartfulness based meditation practices with evidence compiled and presented from related studies claiming the impact of meditation practices. This review aimed to analyze the impact of practices through Heartfulness meditation on personal well-being and the chances that diminish AD. Also, it has provided an overview of the methods and observed the effectiveness of the studies that assess the impact of Heartfulness based meditation aimed at a diversified group of target audiences.

Methods

Search Strategy

According to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (12), this review was carried out. The search for appropriate literature has been performed on online research article databases such as PubMed, PMC, MEDLINE, and Google Scholar on which articles were published until May 2020 using the search keywords which were listed in Table 1. The Search Strategy included focused keywords such as Alzheimer's, Dementia Meditation, Heartfulness, Exercise, Treatment and Sleep. Various combinations of the aforementioned texts were used along with Boolean logic "AND" and "OR" for searching the literature from the online databases. The Search was restricted to articles published in the English language only.

Study Inclusion

The study has chosen the literature which involved the following criteria,

➢ The study should have more than 30 participants.

➢ Heartfulness based meditation for at least consecutive 3 days.

➢ The proper scientific parametric analysis must be presented.

➢ The outcome of the study must clearly state the impact on the practitioners with evidence.

Studies were included based on the above criteria and their interventions, outcomes and parametric analysis. Some studies performed direct examinations of adult and child participants' wellness, who were belong to the various schools, colleges and working professionals. In (13), the participants involved were school children of both sex (13); some of the studies include participants with chronic disease and caregivers (14, 15), and the participants were novices or experienced meditators (16-18).

Studies, which were not relevant to the Heartfulness based meditation techniques, well-being and wellness, articles without detailed examination, and studies that were not available in the English language were excluded from the analysis in this review article.

The two reviewers (AK and CKS) screened the title and abstracts concerning the inclusion criteria and exclusion criteria. The first author (AK) carefully examined the full texts thoroughly and the second author (CKS) resolved any discrepancies.

Table 1: List of search terms used in online databases

S. No.	Type of Intervention	Keywords used in the Search Strategy
1.	Healthcare	"Alzheimer's/Dementia" OR "Meditation Alzheimer's/Dementia"
2.	Alzheimer's/Dementia Affecting Region	"Alzheimer's/Dementia Brain" OR "Alzheimer's Memory" OR "Alzheimer's/Dementia Mind" OR "Alzheimer's/Dementia Sleep"
3.	Alzheimer's/Dementia Cure	"Alzheimer's/Dementia Cure" OR "Alzheimer's/Dementia Exercise" OR "Alzheimer's/Dementia Treatment"
4.	Heartfulness	"Heartfulness" OR "Heartfulness Alzheimer's/Dementia"

Data Extraction

A list of Heartfulness-based research articles was compiled in an Excel workbook. These articles were categorized based on the participants involved in meditation such as students (schools and colleges), public (with and without disease) and working professionals by AK and CKS. They were further extracted in terms of the number of participants, gender, age of the participants, type of issues of the participants and the method of analysis. A detailed essence of the method of study, protocols adopted and validation of study results were carefully extracted. Further, the discrepancies in the data were resolved by the reviewer CKS (Fig. 1).
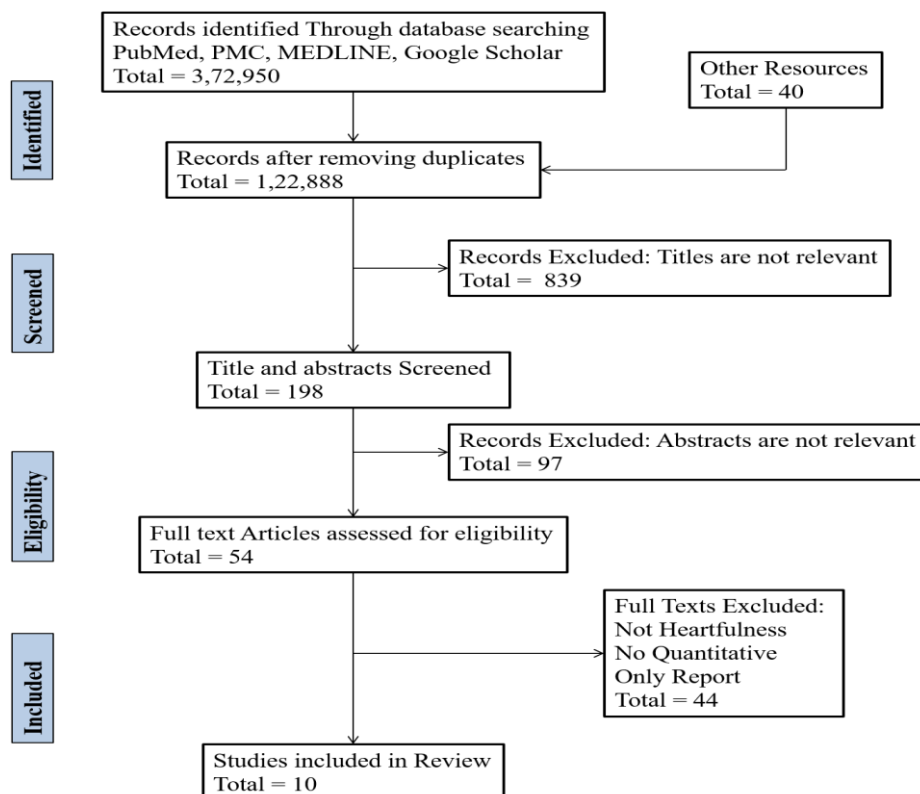
Selection Strategy

Fig. 1: Selection criteria of articles chosen for the survey

Method of Analysis

The articles considered for this review were analyzed based on the synthesis of the qualitative evidence method (19). In that, qualitative research synthesis (20) and Thematic analysis (20) were incorporated for the present review article. The themes of the articles were extracted from the sections namely "Method" as well as "Results" of the selected individual articles, which were utilized for qualitative synthesis. The chosen articles were re-read to get familiarised themselves with the theme and went through every line for coding its quality of results. The extracts of the theme were reviewed again separately for their relevance to the study and further refining. The same process has been carried out for each article to extract the theme and qualitative analysis. Reviewer AK extracted the themes and qualitative analysis was performed by reviewer CKS and further refining works were carried out by AK.

Table 2 summarises the impact of Heartfulness based meditation on AD factors. Here, the impacts of Heartfulness based meditation were tabulated with the studies performed on the different categories of participants. The categories of participants included in the study were school students, college students from the city of Chennai and Indore, nursing students and Heartfulness practitioners. Moreover, the relevant factors of the outcomes after regular practices of Heartfulness based meditation were tabulated for the corresponding methods and the number of days included in the practice sessions. The weightage of each reference considered for the analysis was represented by (*) notation. More weightage had been provided for the references with five (*) and substantially based on the number of stars, the gradual impact of the literature towards this gets varied. Based on the study period, scientific intervention parameter, the rank of the articles, the significant outcomes of each of them has been summarized from their relevance towards Heartfulness based meditation and Alzheimer's disease.

Table 2: Summary of the Impact of Heartfulness based meditation on AD factors

Ref. No.	Weightage	Participants	Number of participants	Number of days of Practice	Parameters measured	Method of Assessment	Impacts	Relevance to AD factors
				Chronic Insomnia				
(15)	***	Chronic insomnia patients	32	8 Weeks	ISI	• Sedative or hypnotic agents were measured at baseline at the end of the 8th week.	• ISI scores from 20.9 to 10.4 • 21 patients have removed sedatives after meditation.	• Sound sleep leads to better connectivity between neurons. • Aged people get more benefits than younger ones.
				Students (School / College)				

(13)	***	School students	112 (Age 12-17) (74 HPS Group and 38 Controls)	13 Wk	War-wick-Edin-burgh's Men-tal Well-being scale is used.	• 2 surveys that measure levels of stress and well-being at baseline and after the completion of the 13-week elective. • Perceived Stress Scale is measured.	• Post-test findings revealed a statistically significant decrease in stress levels. • Coping skills, stress management, and an increase in overall well-being. • Stress, mental health & social-emotional skill improved.	• BP reduction. • Increasing positivity. • Problem handling, thinking ability and anger was improved
(21)	**** *	College students from Chennai	848	3 D	Joy and emotional stress	• 3D Heartfulness master class with the trainer. • The stress questionnaire (30 questions) was filled before and after the class.	• Emotional stress due to overload, tension and harassment reduced and joy increased. • The students who had stress higher in baseline have shown good improvement	• Stress reduction leads to mental stability
(24)	****	College students from Indore	170	14 Wk SDP	14 parameters (anger, empathy, etc.)	• Lecture session followed by a meditation conducted for consecutive 14 wk. • The questionnaire based on emotional wellness is collected from participants.	• Inner calmness, tolerance and empathy increased by 45%. • Anger and stress were reduced by 30%. • Significantly inter-relationships has been increased up to 10%	• Mental balance is improved due to increased calmness and reduced anger.
(23)	***	Nursing Stu-	120 Stu-	3 D	Work-load,	• 3 Consecutive d	• Mean decrease in	• Improvement in

		dents	dents (I, II and IV Year), Chennai		worries, tension and Joy	of the HFN Meditation program. • Questionnaires based on workload, worries and joy was collected from participants. • The questionnaire was collected before and after the session.	tension, workload, harassment and increase in joy • Relieved from stress • The physiological and psychological well-being of caregivers improved.	physiological and psychological factors
				HFN Practitioners				
(16)	*****	HFN Practitioners	60 Experienced Meditators	6 D	EEG	• 3 Tasks: a set of cognitive tasks, Heartfulness guided relaxation and Heartfulness Meditation	• Alpha and delta activity increased. • Cognitive task scores were higher after meditation in both CRT and RAT. • Stronger right brain and left brain activation.	• Brian's activity/connectivity is increased. • Neuroplasticity, the cognitive level is improved.
(17)	*****	HFN Practitioners (ranges from 1 month to 30 yr)	30 (21 male, 9 female); age: 19-70; mean: 45.1 yr; SD:12.7 yr	1 Day	HRV, BP, HR, SPANE	• Three stages rest, cleaning and Meditation. • HRV, BP, HR has been measured before, during and after three stages.	• Mean values of the Low-frequency band (LFnu) were decreased and the High-frequency band (HFnu) is increased after cleaning and meditation the w.r.t. baseline. • Sympathovagal balance	• BP reduced after HFN meditation and cleaning. • High and low-frequency bands were moderated.
(18)	*****	New and experi-	134 with minor	3 D	HR, RR, SBP	• HR, RR and SBP has been	• Moderated effects in ANS,	• Physiological parameters were

						HR, RR and SBP	moderated.
	enced HFN meditators	health issues			measured before and after the meditation	• Experienced elders have shown good changes compared to youngsters.	
		Professionals (Care Givers)					
(14)	***	Residents, faculty and nurses	47 (27 Residents, 8 Faculty and 12 Nurses) (35 Meditators & 12 Controls)	12 Wk	MBI, EWA	• 12 wk of meditation Program. • At the end of the 12th week MBI, EWA and salivary telomere length tests has been taken.	• Improvement in burnout, emotional wellness, and telomere length. • No changes in controls.	• Positive habits reduce BP and increase brain connectivity. • 11 aspects of positive EWA attributes increased and 11 negative EWA attributes decreased after 12 wk of meditation
(10)	***	Caregivers of clinic	1393 (Age 30 to 50)	8 Wk	MBI and EE	• Wellness initiatives included either attending a Heartfulness meditation conference or reading a book about burnout and wellness	• Work-life balance (workload, workflow, and scheduling) is improved. • Mean EE decreased from 9.8 to 8.6 with statistical significance (P=0.014).	• BP reduction

MBI - Maslach Burnout Inventory; EE - Emotional Exhaustion; EWA – Emotional Wellness Assessment; ISI - Insomnia Severity Index; HRV - Heart Rate Variability; BP - Blood Pressure; HR - Heart Rate; SPANE - Scale of Positive and Negative Experience; SD – Standard Deviation; RR - respiratory rate; SBP - Systolic Blood Pressure; HPS - Heartfulness Program for Schools; EEG – Electroencephalogram; HFN – Heartfulness.

Results

Quality Analysis

From the search methodology carried out, 3,72,990 studies were found. After removing the duplicates, 1,22,888 studies were remaining. Titles not relevant were excluded and subsequently, 839 titles had remained. Furthermore, the abstracts were screened and 198 studies were retained. Further, with irrelevant abstracts were excluded, 97 articles remained. Then, after assessing the eligibility constraints, 54 articles were considered. Subsequently, 44 articles without quantitative analysis and Heartfulness were excluded after reviewing the full texts. Finally, 10 papers were included in this review. More de-

tailed information on the selection of the study process is depicted in Fig. 1. The referenced studies were published between the years 1979 and May 2020. The studies were conducted in India, especially in the cities of Indore and Chennai. Followed by, the studies were classified under four categories: chronic insomnia patients study (15); college/school students (13, 21); Heartfulness Meditators (16, 17) and working professionals (14, 22).

Characteristics of the samples

There were ten studies selected for analysis in the review on the effects of HFN on AD and its causal factors. The selected studies were broadly classified under four categories based on the samples involved. The sample sizes were randomly varying among the studies. Overall, 32 chronic patients were involved in the study (15) from the caregivers of clinics 1393 samples were chosen (22); remaining studies were performed with around 50 to 100 samples.

The selected studies had an indiscriminate distribution of samples by their age. The samples include the students having their ages ranging between 12-17 for school students and 17-22 for college students. The study dealt with the experienced meditators following Heartfulness meditation in the age of 19-70 (17), the mean age was 45.1 yr and the standard deviation was 12.7 years. However, in the study related to the professionals, the differences were in the moderated range from 30 to 50 years.

Structure of Training Method:

After the careful filtering of literature, 10 studies were selected for the analysis of Heartfulness meditation. Among the 10 studies, three studies dealt with the Heartfulness meditation on the sample of people involved for 3 d; two studies have a training period of 8 wk and one study was performed with 1 day, remaining were 6 d, 12 wk, 13 wk and 14 wk. The 8, 12, 14-week studies were conducted as a Self-Development Program (SDP) for the samples. Commonly, in all the studies the essential techniques of Heartfulness meditation such as relaxation, meditation, clean-

ing and prayer were introduced to sample people involved in the study and its effects were recorded for the analysis. However, in the 1-day study, only meditation was performed by the people involved in the study.

Generally, the Heartfulness trainers suggest the seekers about to have a minimum of 3 d (23) and the effects of the practice will be rooted deep when the practice is prolonged for long periods (13, 24). The selected studies had shown that any age group of people (above 15) can take up training for their self-improvement.

Method of Qualitative Analysis

The quality of the studies was validated according to the results obtained from the questionnaire (13, 23, 24). The questionnaire was prepared based on the parameters such as worries, joy, tension, anger, empathy, stress and workload (23, 25). This questionnaire was collected from the sample of people before, during and after the meditation practice. In one of the studies, Warwick-Edinburgh Mental Well-being Scale is followed (13); in another study Scale of Positive and Negative Experience (SPANE) is incorporated to measure the effect of meditation on samples. Contradictorily, scientific proofs were obtained in the studies (14, 16) based on the EEG, HRV, BP, RR, Salivary Telomere Length and Insomnia Severity Index (ISI) parameters (15).

The quantitative analysis provided the reduction of the ISI index from 20.9 to 10.4 (15); Inner calmness, tolerance and empathy increased by 45%, anger and stress reduced by 30% and inter-relationships were increased up to 10% (24); the mean was decreased for tension, workload, harassment (23); mean emotional exhaustion (EE) decreased from 9.8 to 8.6 (22). Also, a study gives proof that meditation improves the Sympathovagal balance (17).

Online support intervention outcomes

The selected studies were evaluated on the performance of the meditation on its sample people through online tools (13); specifically, in one of the studies, the online live Masterclass events (25) were conducted to the samples (the college stu-

dents) with prior permission from the concerned authorities. For analyses of the techniques provided by Heartfulness and their impact on Alzheimer's diseases, we explored the data from a different category of studies. It helped the evaluation process to follow a balanced approach irrespective of the group of people engaged, age, locality of the practitioners and their working background.

Strengths and Limitations in the Studies

The present findings were to be interpreted in view of the limitations of the study. The available present studies have limited demographic features of the samples taken for the study (14, 16). Several studies were excluded because of the irrelevancy in data and interpretation. Those articles were excluded since in most of the studies the data presented were clinical type and medications for the diseases and only the very few articles discussed the effect of meditation practices for Alzheimer's disease. The available articles were presented with a lack of quantitative analysis (16). In (17), the assessments were carried out, based only cross-sectional (only one day). The longitudinal study provides consistent and authorized results (13, 14, 24). The scientific physiological proofs were entrusted by the studies emphasizing support towards the effect of meditation (16, 18).

Discussion

Although the regular practices of Heartfulness addressing the effects of Alzheimer's disease were vividly portrayed in literature, there were still many unexplored areas through different meditation techniques. A longitudinal study may be included for consistency measures. Despite these obvious limitations, we address the most substantial findings among them.

Heartfulness practices

Initially, this study is intended to review the effects of Heartfulness on the sample of people practicing meditation. As per the author's

knowledge, this is the first systematic review of the Heartfulness practice. The Heartfulness practice consists of four major elements such as relaxation, meditation, cleaning and prayer (heartfulness.org). At the initial stage, the seekers suggested participating in the Heartfulness practices for 20 to 30 min and the expert meditators can do meditation for a maximum of 1 hour at a time (heartfulness.org). They can also do the same, any number of times in a day.

Targeted audience

The Heartfulness guide Shri. Kamlesh Patel of Heartfulness Institute suggested that sound sleep pattern provides better physical and mental health that leads to better neuronal communication in the entire human body (26, 27). In this review article the students, patients, professionals and regular Heartfulness practitioners has been considered for the study (16, 18). The age group of the samples varies in a wide range, for example, the school/college students were in the 12-23 age group, whereas the professionals and HFN practitioners were in the 19-70 age group, which implies that this practice can be incorporated to any age group of people. However, the adolescent-aged samples (below 15) were given the relaxation practice alone rather than meditation practice (13). However, this regular practice of heartfulness has much more significant improvement in youngsters than in older people (15). In contrast to that, the experienced old meditators have better feelings about HFN practice than novice practitioners, which states that consistency in practices provided better results on the samples (18).

This review article is intended to study the effect of HFN meditation scientifically on the samples considered. The HFN guide stated that a good sleep at night allows the human being to flow along with the natural current (26). The same has been scientifically proven in chronic insomnia patients. The sound sleep pattern followed by the insomnia patients improves their neuronal connectivity, which has reduced the hypnotic pharmacotherapy sedatives intake for them (17). However, here the limitation was that the study

had been performed only for the selected participants of a single organization; also it was a cross-sectional study. One of the causes of insomnia is that long-term stress and mental imbalance, which were found to be reduced and increased the mental stability of the students in the college located in Chennai (18). It has been observed that the students studying in the colleges had developed stress due to the workload, harassment and hence their joy was reduced. These effects were improved with emotional wellness (23).

In the same way, school students' blood pressure was decreased and they had a better positive mood (13). The PSS (Perceived Stress Scale) on ten parameters like upset, unable to control, nervous feeling, problem handling, irritations, and anger were reduced and shown good improvement for the Heartfulness Program for Students (HPS) (13). After HPS, the PSS score was decreased from 20 to 14.62 for the sampled students. It was a longitudinal study and the program was extended for a period of 13-wk. Warwick-Edinburgh Mental Well-being Scale (WEMWBS) score was also increased from 39.8 to 46.4 for the HPS samples. The WEMWBS score considered the characteristics of feelings of usefulness, interest, clarity in thinking, sympathy and empathy, cheerfulness, concentration and emotional stability of samples involved in the study (13). At an early age, mental stability attainment through meditation postpones the symptoms of dementia.

The samples taken from the college students studied in Indore experienced 14-week SDP in the Heartfulness wellness program. The program evoked inner calmness, tolerance and interpersonal skills; subdued negative characteristics such as anger and stress up to 30% (24). The invoked calmness balanced the mind of the sampled students. The working professionals normally have stress, due to the workload and work environment. Their physiological and psychological well-being was enhanced and the mean value of tension was restrained as per the study carried out on the nursing students (22). In line with that study, the work-life balance was achieved for the caregivers of the East Coast-based healthcare or-

ganization. The emotional exhaustion (EE) and MBI of the caregivers were reduced with a significant drop in the mean value of EE from 9.8 to 8.6 (22). A study was concentrated on the telomere length on salivary towards assessing the connectivity of brain neurons (14). The study lasted for 12-wk and had significant changes in emotional wellness and burnout. The assessment of the samples had given positive attributes of EWA such as self-confidence, clarity, empathy, concentration and tolerance enhancement; the negative attributes of EWA such as anger, anxiety, fear, cynicism, jealousy, sorrow and impulsiveness were inhibited on the samples after the training sessions (14). In both the studies the effects of the meditation practices were retained for up to 2 months (14, 22).

Effects of Heartfulness and its measures

EEG waves were reflecting the mood and condition mental of the human being. Heartfulness practitioners had an impact on the spectrum of EEG Waves (16). The experienced meditators had increased alpha and delta activities and the inter-lobe communication in the brain more frequently occurred (16). This study revealed the effect of neuroplasticity on the brain through Heartfulness. The novice and experienced meditators in the study (17, 28, 29) exhibited a Sympathovagal balance after the practice. These meditation practices lowered the Low-frequency band (LF) and enhanced the High-frequency band (HF) of the EEG signal, which in turn was used to realize the Sympathovagal balance (30) on the sample participants. As a base for that, these practices had a good impact on the preliminary symptoms of Sympathovagal balance such as heart rate variability and blood pressure. In this study, all the Heartfulness elements were incorporated (17). In line with the study, another study (18) had come out with the moderated HR, RR and SBP. In this, study the experienced meditators showed better improvement compared to the novices (18). Since the physiological parameters were perfectly enhanced in the studies (16-18) the brain activity was normalized and the balanced mind has lesser stress, which postponed

the symptoms of dementia.

Conclusion

We conducted a review of articles with the outcomes of the Heartfulness meditation and a survey conducted among different age groups of people practicing meditation. The regular practice of Heartfulness meditation and the suggested methods of practice for older adults, students, practitioners and caregivers, provide the best results in terms of enhanced psychological wellbeing. Moreover, effective prevention of AD that is predominant at later stages of life can be done by regular Heartfulness meditation practices. Future studies may involve morphological data for exploring the effect of meditation to give more insights into the impact of Heartfulness meditation.

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Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Disclosure statement

No potential conflict of interest was reported by the authors towards the publication of the article.

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