

# **Meditative Approaches to Improve the Cognitive Functioning Of the Persons with Dementia and Related Cognitive Decline**

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## **Abstract**

This review research paper aimed at examining how different meditative approaches can be used as an intervention to improve or counteract the effect of age related cognitive decline in the populations with Dementia and related conditions. During the study it was reviewed both original review studies as well as clinical trials. The reviewed studies were selected from 2500 Google and Google scholar search results on the topic area. The results indicated that Mindfulness practices are capable of improving the cognitive functioning of Persons with Dementia. The improvements could be seen in the cognitive functions including attention ,improving memory than other memory boosting techniques, reversing and slowing down(including the slowing down the shrinkage of hippocampus and even increasing the hippocampal volume) decay in brain areas associated with memory as well as bringing positive changes. Further, improved functioning in diverse memory domains such as visuo-spatial memory, verbal memory, non-verbal memory, episodic memory, long term memory in general, working memory, as well as memory functioning associated with executive functions and intelligence were also reported.

## Introduction

Though forgetfulness is a normal part of aging, considerable percentage of people in a population experiences a set of symptoms including memory loss and difficulties with thinking, learning, problem solving and language where the decline of memory functioning is severe enough to interfere with the daily life. This comes under a collective term called “Dementia”. The age related cell decay most probably will result in poor performance in several cognitive functions including memory and executive functioning. Based on the symptomatic representation of these deficient functioning, various subspecialties in mental health field identify these conditions as mild cognitive impairments, Dementia etc. The most common form of these clinical conditions is Dementia. Dementia can be defined as a clinical condition where “the person mainly losses the average memory functioning which is simultaneously or subsequently followed by the poor problem solving, poor attention and concentration as well as poor functioning in executive functions”. Clinicians tend to identify Dementia as a group of clinical manifestations rather than a single disease. The demented condition can appear in the forms of Alzheimer’s disease, Dementia with Lewy bodies, brain injury, cerebrovascular disease, Frontotemporal dementia, experience of severe depression and anxiety and some other abnormalities (MacGill, 2017). Some of the studies report that about 60% to 70% of the Dementia population can be accounted to Alzheimer’s disease as the casual condition. Other cases include Vascular or Mixed Vascular causes(20%-30% of demented population). A small portion of the Dementia people have other causes such as Dementia with Lewy bodies , Parkinson’s Disease, Frontal Dementia, Hypothyroidism etc. (Boustani, Schubert &Sennour, 2007).

Being the Most Common Cause of Dementia (**Guerreiro et.al, 2013**), Alzheimer’s disease primarily and typically presents a progressive decline in the memory and other cognitive abilities out of which the deteriorations in the memory is common. When the Alzheimer’s patient becomes progressively impaired in cognitive function and memory, the burden for the assisted care is also increasing (**Reisberg et.al, 2003**). To address this, the practitioners use several treatment options which are both Pharmacological and Non-Pharmacological.

#### Significance of the use of Non Pharmacological Interventions for Dementia

As meditative approaches fall under the umbrella term “Non –Pharmacological Interventions (**Niazi & Niazi, 2011**)”, scientifically demonstrated positive impacts of these interventions should be given sufficient attention. Douglas, (**James & Ballard, 2004**) reviewed available studies on this topic area and highlighted several implications. According to them, as the clinicians pay initial attention to prescribe pharmacological interventions which might have some adverse side effects there for beginning with Non-Pharmacological interventions which have pronounced positive effects is a productive approach. Their review study focused on such productive non-pharmacological interventions for Dementia. The researchers have distinguished among standard therapies, Alternative therapies and Brief Psychotherapies in their list of Non-Pharmacological Interventions. Though meditative approaches are not included directly in their list, they have been considered as one of the Non-Pharmacological Interventions in wide variety of Literature. Similar findings have been reported in the review study done by Vernooij-Dassen et.al (**2010**). With the objective of o exploring the evidence and consensus on psychosocial interventions for persons with dementia in long-term care,

these researchers reviewed 28 related pieces of literature and found that Behavioral management techniques such as behavior therapy, as well as other Non-Pharmacological therapies such as cognitive stimulation, and physical activities (such as walking) were shown positively to impact behavior or physical condition of the persons with Dementia.

### **Objectives of the Study**

As this is a review study on the above topic area, following objectives have been identified by the authors to benefit such target audiences as experts, students or novice researchers and decision makers in the research domain of mindfulness practices to improve the cognitive decline associated with Dementia.

1. Engage in a critical evaluation of the materials that have been published in diverse platforms like scholarly journals, data bases and blogs on the topic area of meditative approaches to improve the cognitive decline associated with Dementia.
2. Carefully identify and synthesize nature of published literature on the topic area of mindfulness practices to improve the cognitive decline associated with Dementia to evaluate the specific research questions, substantive domain, theoretical approaches and/or methodology they have used and thereby provide readers with a state-of-the-art understanding of the above topic area.
3. To identify patterns and trends in the literature in the above topic area.
4. Develop conceptual frameworks to reconcile and extend past research on the domain of meditative practices to improve the cognitive decline associated with Dementia.

## Methodology

Adopting a research design of Domain based review papers, the authors selected the reviewed studies from 2500 Google and Google scholar search results on the topic area. These search results from Google scholar included various studies published in Scholarly journals and conference papers, theses and dissertations, chapters from academic books, technical reports. Further, websites and blogs which quoted published studies have been generated through google search results.

The authors employed an inclusive criteria during the study. Only the studies which were published in above mentioned platforms were included for review. Moreover, the studies which have been published in English language have been included. The studies which were published only as abstracts, and those from other languages have been excluded.

During the search, the terms “mindfulness practices to improve the cognitive decline associated with Dementia, Meditative approaches for age related cognitive decline, meditation for Dementia, Mindfulness for Dementia and cognitive decline” were used to generate search results.

The following sections present the reviews of existing studies in the domain area.

### Meditative approaches

Though it is an ancient Buddhist concept, deriving from Sanskrit to mean” Awareness” (**Evidence-based Synthesis Program (ESP) Center, 2014**), varieties of Mindfulness practices exist in many Eastern contemplative mental exercise traditions such as Meditation, Yoga, and Thai Chi etc. A mindfulness practitioner is expected to be conscious of what is going on at present moment. In such a case, the practitioner is said he or she

is able to consciously regulate attention for incoming external as well as internal experiences at the present moment. Mindfulness is defined as “The Skill of Being Deliberately attentive to one’s experience as it unfolds-without the superimposition of our usual commentary and conceptualizing” (Muesse, 2011). Where mindfulness as the practice while the meditation is the technique (a form of mental and physical exercise) which the practitioner uses. So, varieties of mindfulness such as Thai chi, Yoga, Meditation can be considered as different forms of techniques of mindfulness. Meditation is more concerned about mental exercise while Thai Chi and Yoga Place equal emphasis on physical as well as mental exercise.

### **Therapeutic Value of meditative approaches**

Meditative approaches are increasingly becoming popular as therapeutic interventions for number of clinical conditions with considerable attention from wider range of practitioners in the associated fields (Baer, 2003). In addition, this domain is gaining further and further empirical support from the clinical studies too.

One of the widely accepted short mindfulness intervention form of meditative version is “Mindfulness Based Stress Reduction” which is abbreviated as MBSR, developed by American Clinician called Jon Kabat –Zinn who was a professor in Medicine. This was initially applied to clinical samples those who had stress related clinical condition or chronic pain. Introductory initial program was a 8-10 weeks mindfulness practice course in which once a week mindfulness practice was delivered (Baer, 2003). This included several; mindfulness practices such as “Body Scan” , Breathing, Hatha Yoga, etc. But it did not include rigorous concentration practices like in the traditional mediation. The minimum time period that a participant should practice these mindfulness skills was 45

minutes per day (**Baer, 2003**) which is at the appropriate level for a clinically handicapped person.

In addition to MBSR, “Mindfulness Based-Cognitive Therapy (MBCT) which incorporated elements from one of the psychotherapeutic tradition, Cognitive Behavioral Therapy with MBSR (**Sipe & Eisendrath, 2012**) was used. This encourages the practitioner to attend to new way of thoughts and attend to the new experiences relating to that. The founders of this technique Teasdale, Segal, and Williams (**1995**) proposed that the skills of attentional control taught in mindfulness meditation could be helpful in preventing relapse of major depressive episodes(Baer, 2003). Therefore they incorporated it with Kabat-Zinn’s MBSR. Similar to MBSR, MBCT is also an 8 weeks short mindfulness practice program.

Effect of meditative practice on average cognitive functioning of persons with age related cognitive decay

The effects of meditative interventions to reverse the cognitive decline of the persons with Dementia related conditions has been proven in the studies done by Paller, Creery & Maslar(2014) who studied on “ Benefits of Mindfulness Training for Patients with Progressive Cognitive Decline and their Caregivers. Also Sumecet.al (**2017**) studied on “Mindful Response to Cognitive Decline: In search of Prevention of neurodegenerative disease and Newberg et.al(2013) summarized number of Studies with the title “Meditation and Neurodegenerative Diseases”. Marciniak et.al(2014) who reviewed another series of studies on “ the effects of meditation on neurodegenerative Studies” as well as Boxtel, Bekt, (**de Vugt & Warmenhoven, 2019**) who studied “ Mindfulness Based Interventions for Persons with Dementia and their Caregivers provided supporting evidences.

Wells (as quoted by Elias,2019) wrote that 15-30 minutes guided meditation a day for eight weeks on a group of people with Mild Cognitive impairments (MCI) showed improved cognitive functioning with slow shrinkage of hippocampus which will shrink with dementia. As Elias (2019) further explains, Wells' viewed that mindfulness training can counteract with memory loss progressing into Alzheimer's disease and the mindfulness can have either walking meditation or other types like Yoga or Tai-Chi.

Further, how memory of populations with age related cognitive decline can be improved through mindfulness training, was studied by Lavretsky and team of colleagues(which was done with 25 participants over the age of 55 whose brain and behavioral measures were assessed and along with other findings) and have found that memory training is comparable to Yoga, improving memory than memory boosting other techniques in people with MCI, AD and other forms of dementia (Sullivan, 2016).

Wong, Hassed, Chambers and Coles (2016) reported a study on the effects of mindfulness on persons with MCI, with the aim of understanding how mindfulness improve the cognitive functioning and psychological health adopting a mixed method longitudinal study for a period of one year as a pre and post intervention design. After a 8 week group based intervention program of mindfulness training, participants are to be observed for a follow up period of one year. This study has been registered in Australian New Zealand Clinical trials registry.

Effect of meditative practices on Dementia or Mild cognitive impairment has been studied in several studies. For example, Brenes et.al (2019) in a review in "American journal of Geriatric Psychiatry", presented the effects of Yoga mediation of people with dementia and MCI. The results have shown



that Yoga positively impact on the memory and attention of the above populations. Attention is the chief gateway for any kind of memory encoding and storage. This is common to spatial memory encoding and storage and many other cognitive avenues including creating cognitive maps. This study provides thinking portal for studying whether mindfulness practices are capable of improving the memory of the person with Dementia experiences.

Along with the psychological variable related studies on meditative interventions and age related cognitive decline, the role of hippocampus has also been studied and it is worthy to be reviewed. Hippocampus is the main brain structure which is corresponding to the spatial memory functioning. Hariprasad, Varambally and Gangadhar (2013), aimed at studying whether Yoga practices increase the volume of Hippocampus in elderly subjects. Seven (N) consenting healthy adults in the age between 69-81 years were used as subjects. The practice of different Yogasanas was conducted five days a week for a period of three months by a well trained instructor and after that the subjects had self practiced the mindfulness intervention for another three months according to a given manual. After six months period of practice, the results showed that there is a statistically significant (analyzed using paired sample t test) increase in the bilateral hippocampus volume compared to the control brain region. The hippocampal volume was measured using the Voxel-based-morphometric analyses of the brain before and after the yoga.

A study by Acevedo, **Pospos & Lavretsky(2016)**, reviewed 13 matching studies which were summarizing the meditation's effect on the brain. For this review, they included 7 mindfulness meditation focused studies and 6 active type meditation studies. The results of those studies showed that 17 brain areas have been influenced by above discussed two types of meditations

(Mindfulness and active). Among these 17 brain regions, Thalamus, Hippocampus, Cerebellum were included and they are with a clinical significance for our research interest.

From a non pharmacological intervention perspective , effect of meditation on hippocampal changes were studied by Luders et.al (2012) with 30 individuals who were in the group of long term meditators and another 30 participants as the control group. Left and right hippocampal volume was assessed in the group of meditating people. The findings indicated that left and right hippocampal volumes were larger in the group of meditating people compared to control group, significantly that of the left hippocampus. In another study by Philips (2017) reviewed several studies and evaluated the relationship between modifiable lifestyle factors, neural plasticity and optimal brain health during aging. The study highlighted the future directions in this field. Since mindfulness falls under the category of modifiable lifestyle factors, can effect on neural plasticity. This study is adding further evidence for the mindfulness intervention to topic area of interest.

Eyre, Acevedo, Yang, Siddarth, Van Dyk, Ercoli, Leaver, St. Cyr, Narr, Baune, Kshala & Lavretsky (2016) conducted a study with the objective of exploring the relationship between performance on memory tests and resting state functional connectivity before and after yoga mediators and control subjects. They found that yoga group demonstrated improvements in visuospatial memory along with improvements from depressive states. Further, this improvement in visuospatial memory showed correlations with connectivity between superior parietal network and medial parietal cortex.

Another study by Newberg, Wintering, Waldman, Amen, Khalsa, and Alavi (2010) investigated the effects of 8 weeks Kirtan Kirya meditation and found that improved functioning in

the tests of verbal fluency and working memory by the meditating group compared to the control group. Further , Wong, Hassed, Chambers and Coles (2017) examined the group based 8 week mindfulness training program as one year follow up study and its effects on cognitive function, psychological health and trait mindfulness and finally findings showed that meditation effected on MCI participants to have improved cognitive function along with positive correlations with trait mindfulness. In these results the effects/ or the improvements were identified in the areas of overall cognitive functioning, overall improvement from depression, anxiety, stress etc.

Horr, Rapport and Pillai (2015) who conducted a systematic review on “ Strengths and Limitations of Randomized controlled trials for non pharmacological interventions in Mild cognitive impairments in Alzheimer’s Disease” selected 23 studies were for the study. The results showed that, compared to control subjects, interventions have been effective on positively impacting cognitive impaired persons. So the researchers concluded that the role of non pharmacological interventions as having a positive influence on MCI. In another review study by Burgener, Jao, Anderson and Bossen (2015), of which the objective was to address the need of increased use of evidence based non pharmacological interventions on cognitive functioning for the persons with Dementia, several therapies were listed as showing effectiveness among these therapies, Cognitive training/stimulation, Physical exercise, Music, Biofield, Meditation, Engagement with a naturally restorative environment, and Social engagement were included.

The effect of mindfulness practice on visuospatial memory functioning when practiced brief meditation exercises were evidenced. Malinowski, Moor, Mead & Gruber (2017) who conducted 8 weeks mindfulness training , specially the breathing

awareness practice, for a group of older adults between the ages of 55-75 found that the practice of mindfulness meditation increases the maintenance of goal directed visuospatial attention.

Rakesh, Szabo, Alexopoulos & Zannas (2017) who conducted a review on prevention of cognitive decline of persons with dementia of which the review included systematic reviews, randomized control trials, Meta analytic reviews as well as observational studies showed that it is difficult to establish a clear cause and effect relationship between these prevention interventions and reducing cognitive decline but some variables are positively influential reducing the cognitive decline.

Russell-Williams et.al (2018), in their study they reviewed ten studies of clinical trials and their review was an investigation to understand relationship between mindfulness, meditation, cognition and stress in people with Alzheimer's disease (AD), dementia, mild cognitive impairment and subjective cognitive decline. The clinical trials had various forms of interventions such as Mindfulness based Stress reduction, Kirtan Kriya meditation Alzheimer's Stimulation. The results showed that all studies reported significant findings reducing cognitive decline, reducing perceived stress as well as increasing the quality of life. Similar study which was done as a clinical trial by Quintana-Hernandez investigated whether the practice of mindfulness modifies the course of cognitive impairment in Alzheimer's disease. They found that practice of Mindfulness maintained cognition over the period of two years.

Fountain-Zaragoza and Prakash (2017), whose study's purpose was to identify the effects of mindfulness training on three areas of functioning of older adults, behavioral and neural correlates of attentional performance, Psychological well being, and Systemic Inflammation were included as those three areas and highlighted number of studies which indicated that

the attention related skills are showing a decline with aging process. They could highlight both positive and non significant associations of mindfulness with the attention control in older adults with cognitive decline. Similar finding have been reported in the study done by Moynihan et. al (2013) in which study they tried to understand the effects of MBSR (Mindfulness Based Stress Reduction) on Cognitive improvement.

Impact of combined mindfulness training along with other forms of interventions to improve the quality of life and the healthier brain functioning in the people with dementia and elderly generations were studied by Fotuhi, Lubinsky, Riloff, Trullinger and Ghasemi (2014) in their study which was titled “Evaluation of a multidisciplinary Brain Fitness program for treatments of Cognitive impairments in elderly” and participants formed a group by patients at a clinic who practiced 5 one hour sessions per week for 12 weeks and these patients underwent two neurofeedback sessions, two cognitive skills training sessions and one brain coaching session. The results of pre and post testing data showed that there is a primary improvement neurocognitive test battery which measured letter fluency, verbal fluency, color naming, word reading, and word inhibition, immediate and delayed recalling, etc.

Outlining research strategies in the literature which support the cognitive research hypothesis, Malinowsky and Shalamanova (2017) quoted the “attention model” introduced by Posner and co workers in 2007 and 2012 as well as Posner’s emphasis on working memory during mindfulness meditation. Posner and co-workers who emphasized that during meditation, alerting network establishes sustained alertness and salience network activates some other executive functioning networks where repeated activation of these networks will result in strengthening attentional abilities and working memory were

discussed. Studies done by Xiong and Doraiswamy(2009), Lraouche et.al (2015), Steffener and Stern (2012) have also been presented in supportive of this argument.

Contradictory evidences reported in Yean's doctoral thesis (2015) which consisted two main parts as an extensive literature survey on the impact of mindfulness on improving conditions of persons with Dementia as well as an empirical study which assessed the effects of mindfulness training on the people with dementia. This study used a randomized control trial with a group of 31 patients who presented mild and moderate dementia. For this study the researcher included delivery of twice weekly one hour 10 sessions program and the results showed that the quality of life has been improved in the people with experiences of Alzheimer's disease and a decline in the control group. But no changes have been shown in cognition or stress.

Among the studies which indicate the general improvements in the domain of memory in elderly populations, another study which was conducted by Madori and Fini in 2018 presents two quasi experimental case studies which were done with the persons experiencing Alzheimer's in elderly home settings. The aim of the studies was to measure the effect of mindfulness on several psychological domains such as mood, memorization, socialization and relaxation. Analysis of pre and post test scores showed that memory; mood and relaxation were increased after mediation in both experiments. Similar to this study Larouche, Hudon and Goulet (2018) studied whether mindfulness intervention is capable of improving cognition in older adults with Mild cognitive Impairment as an attentional network training. The Sample consisted 41 older age persons with MCI. Free recall in Episodic Memory task, Sustained Attention to Response Task, Attention Network task, Self reported memory and Attention, were used as assessments. The interventions

given were Mindfulness Based Stress Reduction (MBSR), and Psychoeducation. The results of the study showed that MBSR did not show a sufficient effect on objective cognition aspects but when the subjective cognition aspects was considered, there has been an effect of non pharmacological interventions.

Meditative practices and their impact on activating and improving the attention gateways gained wider attention of the researchers. In a study done by Judy (2015), it was aimed to investigate whether a mindfulness-based intervention could benefit the persons with neurological disorders, particularly whether it could positively impact on attention impairments. In their MBSR model intervention design , 22 participants were pre and post tested. The outcome measures used were The Conners Continuous Performance Test (CPT-3), Mindful Attention Awareness Scale (MAAS), Attention Process Training-II Attention Questionnaire (APT-II AQ) and Clinical Outcome in Routine Evaluation-Outcome Measure (CORE-OM). The results showed that mindfulness ere capable of improving attention and reducing psychological distress. Similarly, Chiesa, Clati and Serretti (2010) reviewed several such studies and summarized how mindfulness practices improves the cognitive functions like focused attention, executive functioning and working memory capacity. In their review, valuable information were provided on how different functions mentioned above improved at different stages of mindfulness practice. Some researcher revealed that focused attention is enhanced during the early phases of mindfulness training and the sustained attention is associated with the later stages. Improvements in working memory capacity are also associated.

Madoriet.al (2016) found that significant increases in the self report feelings of memory abilities, mood, and overall feeling of relaxation were reported after practicing meditation

and Therapeutic Thematic Arts Programming(TTAP) for persons with early Alzheimer's'.

Newberg et.al (2013) reported in almost all studies they reviewed that, meditative interventions are capable of showing improvements in the working memory. In their review, they have quoted the studies done by Chambers et.al who the effect of participation in the Vipassana meditation on working memory capacity Zeidan et.al who studied four day mindfulness retreat on improving working memory capacity. Jha et.al in Baer(2010) who examined the effect of mindfulness based mental fitness training and MBSR on working memory capacity. In contrast to this, Lekahk, Bhatta & Zauszeniewski (2020) in their study where they used a sample of 1135 to study the effect of prayer and meditation on the episodic memory of older adults reported that though the prayer had statistically significant effects on the episodic memory, the meditation did not have.

Contrary to above finding another study conducted by Nidich et.al (2015), using 18 transcendental meditation practicing community dwelling adults, between the ages 60-74, found that the meditating group showed higher levels of cognitive functioning in the areas of fluid reasoning ability, verbal intelligence, long-term memory, and speed of processing than non-meditation controls.

Gard, Holzel & Lazar (2014) systematically reviewed the effects of meditation on age-related cognitive decline, using original studies from Web of Science (1900 to present), PsycINFO (1597 to present), MEDLINE (1950 to present), and CABI (1910 to present).The findings revealed that meditation techniques and reported preliminary positive effects on attention, memory, executive function, processing speed, and general cognition.



## Summary and Conclusions

The central objective of this paper was to examine how different meditative approaches can be used as an intervention to improve or counteract the effect of age related cognitive decline in the populations with Dementia and related conditions. The discussion was started with a basic understanding of different meditative approaches and their therapeutic value. The detailed examination of review studies as well as clinical trials on the effect of meditation practices as interventions to counteract the cognitive decline identified several positive influences which are presented below.

1. Mindfulness practices are capable of reversing and slowing down(including the slowing down the shrinkage of hippocampus and even increasing the hippocampal volume)decay in several brain structures associated with memory and the cognitive decline associated with Dementia and related conditions.
2. Meditation in general improves the cognitive functioning of the persons who are experiencing progressive Dementia Conditions
3. Mindfulness meditation improves memory functioning of persons with Dementia and MCI than other memory boosting techniques does.
4. Meditative approaches improve Attention which functions as a gateway to memory formation.
5. The memory improvements that result due to the practice of mindfulness by persons with Dementia and related conditions can be seen in divers memory domains such as visuo-spatial memory, verbal memory, non-verbal memory, episodic memory, long term memory in general, working memory, as well as memory

functioning associated with executive functions and intelligence.

6. Few studies have provided research findings which indicate that there is no significant positive impact of meditative practices on cognitive decline of the persons with Dementia and they need more empirical evidences to come to generalized conclusions.
7. In order to evaluate the cultural compatibility between these findings and the clinical representation of Dementia population in local context, there are no proper studies published in Sri Lanka.

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