ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research

Vol. 16, Issue, 11, pp.30553-30556, November, 2024
DOI: https://doi.org/10.24941/ijcr.48032.11.2024

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

EFFECTS OF MEDITATION: A POSITIVE OUTLOOK

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ARTICLE INFO

Article History:
Received 24th August, 2024
Received in revised form
17th September, 2024
Accepted 29th October, 2024
Published online 30th November, 2024

Key Words:
Meditation, Mental Health Issues, Negative Thoughts, Peace, Depression, Anxiety.

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ABSTRACT

People have been meditating for thousands of years as meditation is a powerful tool with a number of benefits. It reduces stress , reduces anxiety, improves focus, improves emotional well being. Meditation is important for self realisation i.e. understanding yourself. There has been a spike in the number of people with mental health issues. Meditation is an easy therapeutic way that helps individuals manage their symptoms and reduce negative thought cycles. Knowing about the effects of meditation on the brain can lead to significant advancements in mental health treatment, cognitive enhancement, ageing, and personal development.

Citation: Aditi Suri and Dr. Manjari Kishore. 2024. "Effects of Meditation: A positive outlook*". International Journal of Current Research*, 16, (11), 30553-30556.

INTRODUCTION

Meditation is a practice to take deep rest and be alert, conscious at the same time! It helps calm mind and get in touch with your inner joy. Meditation is the way of relaxing your body and mind by connecting you to your inner self to attain love, joy, and peace. Meditation is an important component of yoga which helps in curing different mental illnesses such as depression, pain and anxiety. More and more psychiatrists, psychologists and other mental health professionals are incorporating training on meditation into their psychotherapy practice. Meditation helps us become aware of the connection between our emotional, mental and physical levels. Relaxation gained from meditation plays a significant role in supporting psychological and mental well-being. Meditation and other relaxation techniques have been found to be useful in changing the level of neurotransmitters that help in altering the mood and personality of the practitioners.[Vijayaraghavan & Chandran, 2019]. Meditation has both physical and mental health benefits.Stress has a direct negative impact on both the mind and body. Meditation can significantly decrease stress and anxiety by promoting a state of relaxation and enhancing emotional regulation. Also there is strong evidence that meditation lowers blood pressure and heart rate thus improves longevity.

EFFECTS OF MEDITATION

Structural Changes: Regular meditation can lead to structural changes in the brain. Areas such as the prefrontal cortex (associated with decision-making, attention, and self-control) and the hippocampus (involved in memory and learning) are directly get effected.

Reduced Stress and Anxiety: Meditation decreases activity in the amygdala, the brain's stress center.

Enhanced Focus and Attention: Meditation improves attention span and the ability to concentrate.

Emotional Regulation: resulting in more positive outlook on life.

Neuroplasticity: Meditation promotes neuroplasticity, which is crucial for learning new skills, recovery from brain injuries, and improving cognitive functions.

Reduction in Age-Related Brain Degeneration: Meditators have been found to have less age-related loss of gray matter compared to non-meditators, indicating a protective effect against neurodegenerative diseases.

TYPES OF MEDITATION

Presently many meditation techniques are being practised. However, all of them can be grouped into two basic approaches- Concentrative meditations and mindfulness/ insight meditations.

Concentration meditation: Aims at single pointed focus on some sound, image or sensation to still the mind and achieve greater awareness. Most popular form of this meditation is "transcendental meditation"(TM) developed by Maharishi Mahesh Yogi in 1958. TM is generally done by focusing the mind on some mantra (sound) to achieve a transcendental state of consciousness.

Mindfulness meditation: On the other hand involves opening up or becoming more alert to the continuous passing stream of thoughts, images, emotions and sensations without identifying oneself with them. Such practice helps in developing a non-reactive state of mind, which is the foundation for a calm and peaceful state of consciousness. (Hussain & Bhushan, 2010).
Other examples include

Tai chi, yog nidra, chakra meditation, zazen. Choosing the right type of meditation depends on personal preference, goals, and individual needs.

CHANGES IN BRAIN

Moment after moment, the mind wanders. It is never still, always thinking about something or the other. And yet, we believe our mind is who we are; our personality and thoughts define us. Various scientific studies have documented the restless, wandering mind.MRI scans of the brain have documented that there are particular areas of the brain that are active when the mind wanders. The brain's frontal and parietal cortex areas are called the "default network." When we are not busy with an external activity, this default network automatically activates. In other words, The mind is naturally inclined to wander and is automatically triggered by spontaneous activity within the brain. The existence of this default network has been scientifically documented, which shows that the wandering of the mind is not just a mental phenomenon but is also the result of normal processes occurring in brain. Meditation helps Neuropsychologists who study the default network that traps the mind in a wandering mode tell us that meditation has a definite functional and physiologic effect. In an article published in the online journal BioMed Research International, "The Meditative Mind: A Comprehensive Meta-Analysis of MRI Studies," the researchers write:

"**Meditation practice induces enhancement of at least four different abilities:**

- Sustained attention,
- Monitoring faculty (to detect mind wandering),
- The ability to disengage from a distracting object without further involvement (attentional switching),
- And the ability to redirect focus to the chosen object (selective attention).

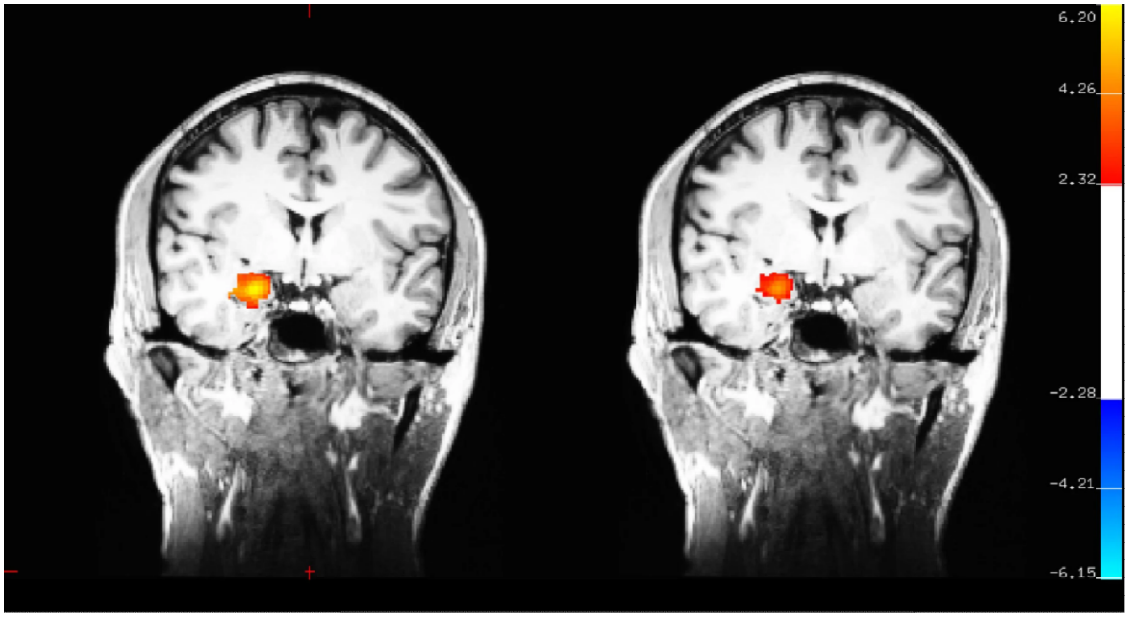
Research studies using MRI scans show that meditation is associated with reduced activation of the default mode network – the activity in the brain when our mind wanders.

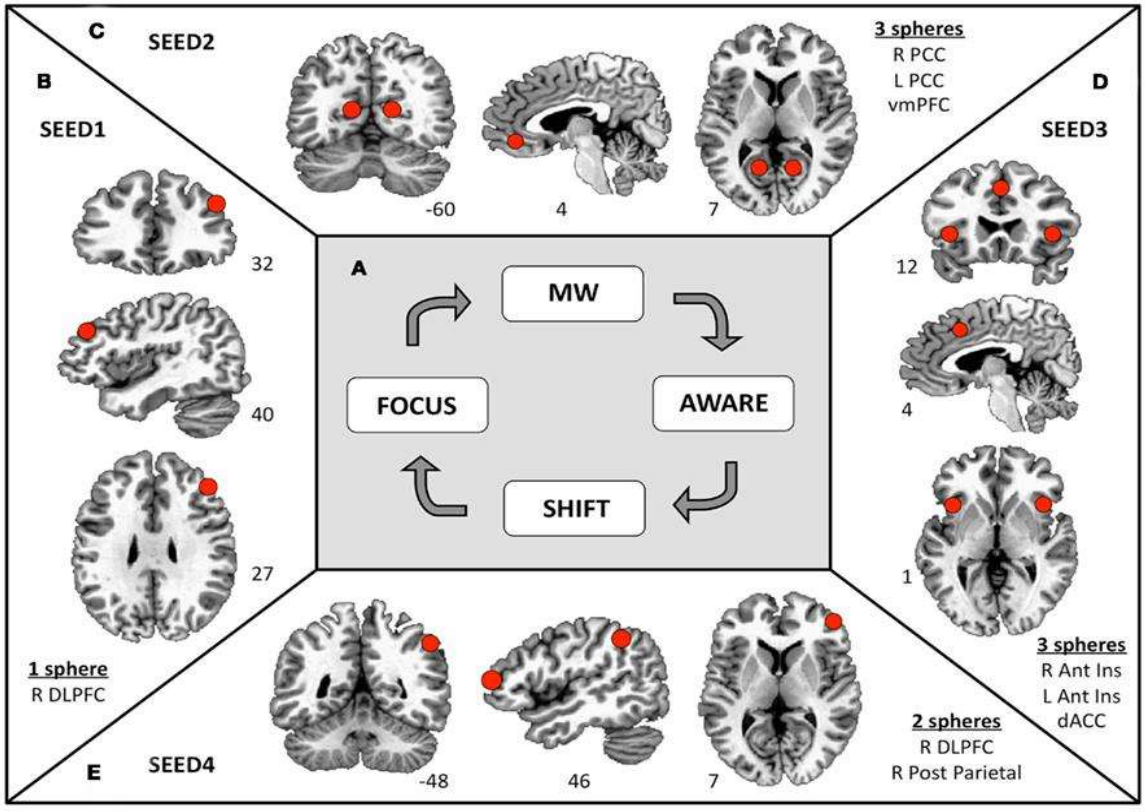
Studies have found that, compared with control participants, expert meditators showed increased grey matter throughout the brain and the brainstem. Concluding that meditation even causes measurable physical changes in the brain. Brain 'morphology' refers to the structure, shape, and composition of the brain; The study and measurement of brain morphology by different neuroimaging methods is called 'morphometry' or 'morphometric neuroimaging.' Several important studies have implied that there is increase in both gray and white matter of the brain (Taubert *et al*., 2012, Zatorre *et al*., 2012) and improvement in different skills, such as juggling (Draganski *et al*., 2004, Scholz *et al*., 2009) and musical instrument playing (Hyde *et al*., 2009). Even gross physical activities, such as aerobic exercise, show an improving effect on brain morphology (Fox *et al*., 2014).

The amygdala present in the brain which is a part of limbic system functions in regulating anxiety, aggression, fear conditioning, emotional memory, and social cognition.[1] Electrical stimulation of the amygdala evokes fear and anxiety responses in humans it is also involved in conditioning using stimuli of appetite such as food, sex, and drugs. As for its role in memory, it helps strengthen memories linked to emotions. It plays a key part in how we learn and store emotional experiences, making those memories stronger and easier to remember (Hasan *et al*., 2023). Studies using MRI scans have shown that long-term meditators often have a less active amygdala compared to non-meditators. This reduction in volume is associated with decreased emotional reactivity and stress.

MRI IMAGES: Desbordes' research uses functional magnetic resonance imaging (fMRI), that not only takes images of the brain, but also records brain activity occurring during the scan. In 2012, she demonstrated that changes in brain activity in subjects who have learned to meditate remain unchanged even when they're not meditating. Desbordes took before-and-after scans of subjects who learned to meditate over the course of two months. She scanned them not while they were meditating, but also when they were performing everyday tasks. The scans detected changes in the subjects' brain activation patterns from the beginning to the end of the study, where changes in amygdala have been detected. Functional MRI (left) showing activation in the amygdala when participants were watching images with emotional content before learning meditation. After almost 2 months of training in meditation (right) note that the amygdala is less activated after the meditation training.(powell *et al* 2018)

Most common reported are structural changes in anterior cingulate cortex, superior and inferior frontal cortex, and prefrontal cortex. These regions are responsible for attention, realise internal experience, sensory processing, and executive functions. Some studies report increased volume of hippocampi, which are important for memory. Several mechanisms explain increased cortical thickness in meditators : neuronal arborization, multiplication of glial cells, or formation of vessels. This also suggests that meditation could potentially lead to neuroregeneration.(Marciniak *et al*., 2014)
A study on Effects of meditation experience on functional connectivity of distributed brain networks (by Wendy Hsaenkamp, Lawrence W. Barsalou Department of Psychology, Emory university, Atlanta, GA, USA) helps in showing the areas of brain that were activated by meditation.





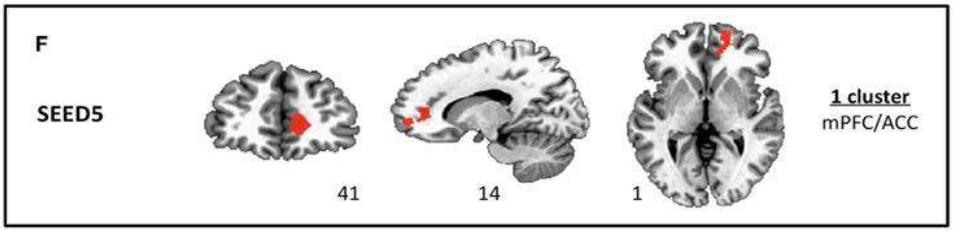


Figure 1. Functional connectivity seeds

(A) A four-stage model of cognitive states experienced during FA meditation. Sustained focus on an object (FOCUS) is interrupted by mind wandering (MW). At some time during MW, awareness arises that the mind is not on the object (AWARE), followed by disengagement from the current train of thought and shifting of attention (SHIFT) back to the object (FOCUS) (Hasenkamp *et al*., 2012). (B) On the activations from the FOCUS phase, an ROI was constructed around the right dlPFC (SEED1). (C) On the activations from the MW phase, ROIs were constructed around the ventromedial PFC and bilateral posterior cingulate cortex (SEED2). (D) On the activations from the AWARE phase, ROIs were constructed around the dorsal ACC and bilateral anterior insula (SEED3). (E) On the activations from the SHIFT phase, ROIs were constructed around the right dlPFC and the right posterior parietal lobule (SEED4). (F) A cluster in the medial PFC/ACC was found to be less active during the SHIFT condition as participants' meditation experience increased . To further understand this finding, this cluster is included as SEED5.

Abbreviations

- Dorsolateral prefrontal cortex (dlPFC)
- Anterior cingulate cortex (ACC)
- Medial prefrontal cortex (mPFC)
- ROI - stands for Region of Interest. It refers to a specific area of the brain that researchers focus on during a study or analysis.

The above findings contribute to the increasing evidence that the duration of meditation practice is linked to changes in brain activity and connectivity, particularly in attentional regions. Therefore brain networks trained during meditation can be re-wired to have lasting changes (Hasenkamp & Barsalou, 2012)

CONCLUSION

The state of meditation directs us as to how to go further and enter into the realm of higher state of consciousness. Meditation has many impacts on the brain such as increases white and grey matter, decreases amygdala activity, emotional well being, decreases anxiety and improves overall mental health. Meditation is nothing but a source of autosuggestion which brings an immediate feeling of relaxation.

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