The International Journal of Indian Psychology
ISSN 2348-5396 (Online) | ISSN: 2349-3429 (Print)
Volume 12, Issue 1, January- March, 2024
DIP: 18.01.130.20241201, DOI: 10.25215/1201.130
https://www.ijip.in

Research Paper

Effect of Mindfulness-Based Cognitive Therapy on Neurocognitive Functions Among Depression Patients

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ABSTRACT

Background: Mindfulness-based cognitive therapy (MBCT), an emerging form of psychotherapy, has shown promise in treating significant depression, anxiety, and substance dependence, among other comorbid and related conditions. The intervention's theoretical underpinnings suggest that either a rise in mindfulness or a fall in unfavorable, repetitive thoughts could serve as potential change mechanisms. Mindfulness-based therapies offer an evidence-based, mind-body complementary treatment approach for a range of psychological illnesses. Giving individuals the tools they need to deal with depressive symptoms as they arise is the aim of MBCT. Those that are adept at these abilities might be able to rely on them in stressful situations or emergency situations. This information can help in the healing process by teaching people how to counteract negative sensations by introducing positive thoughts into depressing ones. **Aim and Objective:** This study was done with the objective to study the effect of Mindfulness Based Cognitive Therapy on neurocognitive functions on depressive patients. **Materials and Methods:** Thirty diagnosed cases of MDD (mild to moderate level) according to ICD-10 were selected as the participants and were randomly divided into two groups: Control and Experiment Groups. Pre-test assessments were done using Stroop Neuropsychological Screening Test (SNST), P.G.I Memory Scale (PGIMS), Trail Making Test (TMT), Beck and Depression Inventory (BDI). Thereafter, 16 sessions of MBCT were conducted as an intervention only with the Experiment group subsequently post-test assessments were performed to measure the difference. **Results:** The post-test findings revealed a significant decrease in the level of neurocognitive impairment on the conducted tests, and depressive symptoms on BDI of the depressive patients of the experiment group than the participants of the control group. **Conclusion:** It can be concluded with the above findings that, MBCT has a significant effect on neurocognitive impairments in depressive patients.

Keywords: *Mindfulness, Cognitive Therapy, Neurocognitive Functions, Depression Patients*

Depression

Depression is a type of mood disorder characterized by a chronic sense of hopelessness and boredom. It is not the same as the mood swings that people encounter daily.

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Received: December 30, 2023; Revision Received: February 24, 2024; Accepted: February 28, 2024

Major depressive disorder (DSM-5) and depressive disorder (ICD-11) are other names for it. The term "depression" is fairly broad and can refer to sickness states as well as affective states, temperament states, syndromes, or diseases.

A depressed "affect" is defined as a fleeting, inconsequential state of feeling "discouraged," " depressed," or "blue" and typically occurs about a certain situation.

A sad mental state is more likely to occur, is likely to be regarded as unusual or abnormal, is l inked to negative thoughts (such as helplessness, hopelessness, and future negativity), and ma y affect behavior. The fundamental idea behind it is a decline in the person's innate level of self-esteem, with the degree of this decline roughly corresponding to the intensity of the emotional state.

The classic condition in this group of illnesses is major depressive disorder. It is typified by distinct episodes lasting at least two weeks (but most continue much longer), with inter-episode remissions and distinct alterations in effect, cognition, and neuro vegetative processes. Though most cases of the disease are recurring, a diagnosis based on a single episode is nevertheless achievable. The distinction between common sadness and mourning from a significant depressive episode is carefully considered. While bereavement can cause extreme sorrow, severe depressive disorder episodes are not usually brought on by it. When they do occur simultaneously, the prognosis is worse than with grief that is not accompanied by depression, and the depressive symptoms and functional impairment tend to be more severe. When they do coexist, the prognosis is poorer than in cases of bereavement without serious depressive illness because the depressed symptoms and functional impairment are typically more severe. People who are already vulnerable to depressive disorders are more likely to experience bereavement- related depression, and antidepressant medication may help them recover.

The DSM-5 outlines the following criteria to make a diagnosis of depression. The individual must be experiencing five or more symptoms during the same 2-week period and at least one of the symptoms should be either (1) depressed mood or (2) loss of interest or pleasure.

1. Depressed mood most of the day, nearly every day.
2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day.
3. Significant weight loss when not dieting or weight gain, or decrease or increase in appetite nearly every day.
4. A slowing down of thought and a reduction of physical movement (observable by others, not merely subjective feelings of restlessness or being slowed down).
5. Fatigue or loss of energy nearly every day.
6. Feelings of worthlessness or excessive or inappropriate guilt nearly every day.
7. Diminished ability to think or concentrate, or indecisiveness, nearly every day.
8. Recurrent thoughts of death, recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.

To receive a diagnosis of depression, these symptoms must cause the individual clinically significant distress or impairment in social, occupational, or other important areas of functioning. The symptoms must also not be a result of substance abuse or another medical condition.

In the US, the 12-month prevalence of major depressive disorder is roughly 7%; however, there are notable age group disparities, with the prevalence in those between the ages of 18 and 29 being three times higher than that in people 60 years of age or older.

From early adolescence onward, female rates are 1.5–3 times higher than those of boys.
A person with depression experiences a mood condition that impairs their ability to think clearly, reduces their willingness to take action, modifies their intimate bodily functions, such as eating and sleeping, and leaves them feeling helpless in the face of excruciating mental pain and suffering. Even though each person experiences their suffering, the number of people who experience depression is startling. These mood disorders rank among the most common mental diseases, according to data from community and hospital research. This conclusion is strikingly constant across the globe.

The classic condition in this group of illnesses is major depressive disorder. It is typified by distinct episodes lasting at least two weeks (but most continue much longer), with inter-episode remissions and distinct alterations in affect, cognition, and neurovegetative processes. Though most cases of the disease are recurring, a diagnosis based on a single episode is nevertheless achievable. The distinction between common sadness and mourning from a significant depressive episode is carefully considered. While bereavement can cause extreme sorrow, severe depressive disorder episodes are not usually brought on by it. When they do coexist, the prognosis is poorer than in cases of bereavement without serious depressive illness because the depressed symptoms and functional impairment are typically more severe. People who are already vulnerable to depressive disorders are more likely to experience bereavement-related depression, and antidepressant medication may help them recover.

With the exception of weight change and suicidal thoughts, the criteria symptoms for major depressive disorder must be present almost every day in order to be diagnosed. A depressed mood needs to be present almost every day and for the majority of the day. A diagnosis of depression may be made too low if associated symptoms, such as exhaustion or sleeplessness, are not thoroughly investigated. Although it may be initially denied, sadness can later be revealed during an interview or deduced from a person's manner and facial expressions. When working with patients who concentrate on a bodily complaint, physicians should ascertain whether the discomfort resulting from that complaint is connected to certain symptoms of depression. A large percentage of cases have fatigue and sleep difficulties; psychomotor disturbances are far less common but suggest a higher overall severity, as does the prevalence of delusional or nearly delusional guilt.

A major depressive episode is defined as a duration of at least two weeks in which the patient experiences depression or loses interest in or enjoyment from almost all activities. Instead of being depressed, children and teenagers may be irritated. In addition, the person must exhibit at least four more symptoms chosen from a list that includes altered appetite, weight, sleep patterns, and psychomotor activity; low energy; guilt or worthlessness feelings; trouble focusing, thinking clearly, or making decisions; or recurrent thoughts of suicide, death, or suicidal ideation or plans or attempts. A symptom has to be exacerbated from the person's pre- episode status or novel to qualify as part of a major depressive episode. The symptoms must last for the majority of the day, almost every day, for a minimum of two weeks in a row. Clinically severe distress or impairment in social, occupational, or other key domains of functioning must accompany the episode. Some

people with milder episodes may seem to be operating normally, but they are clearly putting forth more effort.

Mindfulness-Based Cognitive Therapy

The awareness that arises from purposefully paying attention to things as they are in the present moment without passing judgment on them has been characterized as mindfulness. As a result, mindfulness satisfies many of the criteria that our analysis found to be essential for learning in a relapse prevention program. Recognizing the need for corrective action requires first being aware of the thought, feeling, and physical sensation patterns that define relapse-related mind states (and the driven–doing mode of mind more broadly). By deliberately altering the focus and attentional style, processing can be transitioned from one cognitive mode to another via a "mental gear lever." Furthermore, mindfulness's non-judgmental, in-the-moment focus suggests that it is, in fact, strongly associated with the being mode of mind. Put differently, mindfulness offers a way to shift mental gears when letting go of unhealthy, "doing-related" mental states as well as a different mental gear, or incompatible mode of mind, to move to.

Mindfulness-based cognitive therapy (MBCT), a new kind of psychotherapy, has shown promise in treating serious depression, anxiety, and substance dependence, among other comorbid and related conditions. The intervention's theoretical underpinnings suggest that either a rise in mindfulness or a fall in unfavorable, repetitive thoughts could serve as potential change mechanisms. For a range of psychological problems, mindfulness-based therapies offer an evidence-based, mind-body complementary treatment approach. Giving individuals the tools they need to deal with depression symptoms as they arise is the aim of MBCT. Those that are adept at these abilities might be able to rely on them in stressful situations or emergencies. This understanding could facilitate healing by teaching people how to counterbalance depressing sensations with optimistic thoughts.

Zindel Segal and associates created the Mindfulness-

Based Cognitive Therapy (MCBT) to enhance cognitive therapy by merging it with Jon Kaba t-Zinn's Mindfulness-based stress reduction approach.

According to the program, mindfulness is the state of consciousness attained by deliberately focusing on the here and now and how things are without passing judgment (Sigel et al., 2003). Since the MBCT consists of eight weeks of continuous 2- hour sessions, it is comparable to the MBSR.

In addition, the program offers both structured and unstructured meditation exercises, such as body scans, sitting and walking meditations, mindful movement inspired by Hatha yoga, thre e-minute breathing spaces, and concentrated awareness of everyday tasks (Sipe et al., 2012). In the initial sessions, participants engage in guided meditations wherein they are instructed to focus on their breathing and their physical sensations. As they advance, people are urged to start personal activities such as concentration and raising mental awareness of things, including feelings and ideas they would want to get over. Similar to MSBR, the MBCT assigns homework that consists of guided meditation recordings for 45 minutes of meditation.

The curriculum also includes components of depression psychoeducation and cognitive therapy. This enables people to comprehend that attempting to suppress or ignore uncomfortable thoughts and emotions just makes matters worse and increases the likelihood

that depression will worsen rather than get better. Additionally, the program includes behavioral components that help people get better at doing well-being-promoting activities, such as bathing and listening to enticing music (Sipe et al., 2012).

Participants also learn how to recognize early warning signals or ideas that could exacerbate their symptoms and what to do when they do. While the program includes elements of cognitive therapy, MCBT is different from cognitive therapy in that it focuses on helping participants improve metacognitive awareness by helping them become more aware of the relationship between their thoughts and feelings, rather than changing or altering the participants' thoughts through content (Sipe et al., 2012).

Mindfulness therapies are now being tested on various samples and constructs. Mindfulness-based cognitive therapy (MBCT) is the most extensively used intervention. MBCT is the third-generation wave of cognitive therapy (CT) on the horizon, designed to avoid depression relapse. MBCT, like cognitive therapy, strives to improve the ability to step out of the negative thinking process (which leads to depressive symptoms, loneliness, discontent with life, and anxiety) and reduce holding to any unpleasant thought or painful memories. The influence and relationships of mindfulness on quality of life have been studied by researchers. It has been discovered that as people age, they face challenges that they may not have faced before, such as loss of friends due to death or other personal reasons, loss of spouse or parent, loss of independence, retirement, change/loss of physical health, and diminished income. Care, belonging, security (emotionally and financially), social contacts, and alliances become vital at this period for meeting these requirements. However, attachment to self and others pulls them close to loneliness, as do expectations and clutching. When secondary needs, including social and emotional aspects, go unsatisfied, it leads to feelings of unwantedness, uselessness, inferiority, and resentment, anxiety, low self-esteem, loss of identity, low confidence, loss of trust, and feelings that are not conducive to good personal/social adjustment, all of which contribute to a poor quality of life. The fear of losing something or someone, over possessiveness, and avoiding things that one desperately desires, as well as repetitive negative thought patterns about it; clinging to negative thoughts, memories, and wondering why or how it happened and what could have been done?, allowing the negative vibes to affect their present, very often leads to suffering, also known in clinical terms as loneliness and despair. This is a never-ending loop that eventually leads to depression. Thus, an endeavor must be made among the elderly to convey the moment-to-moment experience in awareness of emotions and thoughts without personally attaching to them.

Mindfulness is a new and rapidly emerging field. Initially utilized as a meditation technique in psychology, it is now widely used in conjunction with a variety of psychotherapies. Mindfulness focuses on self-observation and strengthening one's sensitivity. It is a focused and aware state in which a person observes one's activities and behaviours not just outside but also inside (Baumgardner, Crothers 2009). It focuses on studying oneself from the inside out. It is a high level of awareness, a state of consciousness about oneself and what is happening right now. This awareness includes keeping an eye on both the internal and external environments. "Paying attention to oneself and the surrounding in a particular way, that is on purpose, in the present moment and non-judgmentally experiencing the moment" is how Kabat-Zinn (1994) described mindfulness (Bentley, 2007).

Understanding things as they are, without passing judgment, evaluating, or analyzing them, is made possible by mindfulness (Kabat-Zinn, 1990). When it comes to mindfulness, it can be characterized as a non-eaborative, present-centered, and non-judgmental practice. This acknowledges and accepts the awareness of arising sensations, thoughts, and feelings for what they are (WitkiewitZ, Marlatt, 2007). Intention (on purpose), Attention (paying attention), and Attitude (in a certain way, i.e., mindfulness qualities) are all embodied in mindfulness, along with reperceiving, which promotes clarity in the experiences of mind, body, thoughts, and emotions.

According to Shapiro, Astin, Bishop, and Cordova (2005), the axiom process also entails self- regulation, self-management, emotional, cognitive, and behavioral flexibility, values definition, and exposure. The emergence and spread of Zen meditation in the 1050s and 1960s laid the groundwork for mindfulness. The application of meditation techniques in psychotherapy gained traction in the early 1960s (Boss, 1965), marking a turning point in psychology as psychoanalysts quickly started using it (Watts, 1961). In experimental psychology, awareness and consciousness, including meditation, began to gain attention in the 1960s and 1970s. These concepts were investigated and studied using electronic tools such as EEGs, MRIs, and others (Wallance, 1971). Research on meditation revealed persistent alpha waves and a lowering of the metabolic rate in the meditated person. Up until the late 1970s, research on mindfulness meditation as a crucial component for improving mental and physical health was lacking.

Buddhism places a strong emphasis on mindfulness, which has been practiced for many years and is ingrained in spiritual traditions. Subsequently, Western psychology and medicine adopted it (Rosch, 2007). Nonetheless, there are three ways in which the conceptions of mindfulness in these domains diverge:

Contextual: In contrast to the western conception of mindfulness, which is independent of spiritual practices, mindfulness in the Buddhist tradition is seen as one of the elements required for achieving the ultimate goal and attainment of liberation from suffering (that is, the eightfold paths) (Keng, Smoski and Robins, 2011).

The process level: Mindfulness is only to be practiced in the Buddhist environment in order to reflect the teachings of the Buddha, such as suffering and impermanence, like the eightfold path of mindfulness is called samma-samadhi (a Sanskrit word meaning "concentration practice"). Its foundation, the satipattana sutta, suggests that one can only achieve mindfulness by means of the four references, which are one's body functions, sensations, feelings, and consciousness, as well as the contents of consciousness (Cicco, 2002). However, in Western practice, impermanence and non-self-aspects are not given much importance.

At content level: mindfulness is understood in Buddhism as an introspective awareness, meaning that it is primarily concerned with awareness of the external environment as well as internal processes and experiences. While in Western medicine studies mindfulness is studied as an awareness that includes almost all forms of objects in a person's external and internal experience, it focuses on the features of the sensory objects, which is not what the Buddhist teaching does (Keng, Smoski, and Robins, 2011).

The main idea behind mindfulness, according to Buddhist teachings, is to pay attention to how one feels and reacts to the object.To treat psychiatric issues, Kabat-Zinn used mindfulness meditation as a behavioral method. The method, which was formerly known as mindfulness- based stress reduction, is now unidentified and was utilized to treat patients with illnesses and chronic pain (Kabat Inn, 1990). Since the inception of MBSR, mindfulness has been associated with a number of concepts and methods. Additional mindfulness-based approaches include: Acceptance and Commitment Therapy (ACT) by Hayes (1999); Mindfulness-Based Dialectical Behavior Therapy (DBT) (Linehan 1993a); and Mindfulness-Based Cognitive Therapy (MBCT), which was established in 2002 by Segal, Williams & Teasdale (Segal, Williams & Teasdale, 2013).

Mindfulness-based stress reduction (MBSR) program

MBSR, or the stress reduction and relaxation program, was created by Kabat Zinn in 1990. This program consists of an 8–10 week course for a sample of up to 30 individuals, meeting weekly for 2–2.5 hours to practice mindfulness meditation techniques, discuss stress and coping mechanisms, and get homework assignments that involve breathing exercises and meditation. It is utilized in a behavioral medicine environment and was designed for a population with a variety of stress-related problems and chronic pain.

In addition, an all-day, seven and a half-hour session of intensive mindfulness exercises is part of MBSR. This session takes place in the sixth week of the course and focuses on several types of meditation. Take the body scan exercise, for instance. Within the 45-minute time restriction, different bodily parts receive attention. For this practice, the subject is requested to lie down and close their eyes while observing these places. In sitting meditation, practitioners are urged to close their eyes and sit comfortably on a cushion or meditation mat while maintaining a relaxed, awake posture. They are also asked to focus their attention on their breathing. One type of yoga practice, called hatha yoga, teaches practitioners to be aware of their body's sensations while they move and stretch different body regions. Participants in this therapy are expected to practice mindfulness while engaging in routine tasks such as eating, standing, and walking.

Based mostly on Kabat-Zinn's (1990) MBSR approach, mindfulness-based cognitive therapy (MBCT) is an eight-week manualized group intervention (Segal, Williams, & Teasdale, 2013). This program incorporates elements of the Beck cognitive behavioral therapy paradigm that support a decentred view of one's ideas, such as observing thoughts as instantaneous mental occurrences. The methods and decentred approach are used to address felt emotions and bodily experiences (Teasdale et al., 2002).

Segal, Williams, and Teasdale's (2002) Mindfulness-Based Stress Reduction method, created by Jon Kabat-Zinn, served as the foundation for MBCT. MBCT is an 8-week group or individual-based therapeutic program that combines mindfulness exercises and cognitive therapy techniques to avoid recurrence in depression that has been remitted (Baer et al., 2006). This is one of the methods employed in the treatment of people with depression, phobias, and diseases related to anxiety. The results of this area's searches indicated behavioral improvements and increased personal wellbeing.

MBCT is a blend of cognitive behavioral therapy (CBT), mindfulness training, and attitudes associated with compassion and loving kindness. The theory behind it originated with Bernard and Teasdale's Interacting Cognitive Subsystem (ICS) theory. According to ICS,

cognition is a network of subsystems, each with its own memory and code (Segal, Williams, and Teasdale, 2002). It illustrates how the mind works in several ways, with each mode handling the reception and processing of each thought and feeling. Being and doing are the two primary modes.

While doing mode consists of a goal-oriented state where conflict arises between how things are and how the mind wishes things to be, being mode consists of accepting and allowing what is coming in or towards self. When a person only uses one mode and any of the modes is inhibited, distress results. Accordingly, better mental health will result from an individual's ability to switch between various modes freely, and cognitive therapy supports this idea (Mayne and Bonanno, 2001). According to Segal, Williams, and Teasdale (2013), an individual can effectively manage pain by being present in the moment, embracing uncomfortable emotions and thoughts, and practicing self-compassion.

Neurocognitive Functions

Neurocognitive functions are cognitive traits associated with distinct illness processes that are linked to particular brain pathways or locations. When cognitive problems are suspected, certain neurocognitive tests can be used to determine which brain regions are involved. Neurocognitive functions are mental aptitudes that are closely linked to the capacities of particular brain regions, processes, or cortical networks; these capacities are ultimately supported by the neurological framework that underlies the cerebrum (for example, at the cellular and subatomic level). Their understanding is thus closely related to the fields of cognitive neuroscience and neuropsychology, which both aim to fully understand the relationship between cognition and behavior and the structure and function of the brain. The term "neurocognitive" refers to cognitive processes that are intimately associated with specific brain regions, neural pathways, or cortical networks. As a result, their knowledge is strongly related to the fields of cognitive neuroscience and neuropsychology, which both generally aim to comprehend the relationship between the structure and function of the brain and cognition and behavior.

Even though our brains are amazing, complicated organs that regulate almost every aspect of our lives, including our ability to move and process information, they are frequently only thought of as the brain's repository for memories. For this reason, neurological conditions such as Alzheimer's disease are frequently thought of as memory disorders. Even though memory is a crucial component of cognitive function and is necessary for daily functioning, neurological illnesses only affect a small portion of the brain's capacity.

The brain is responsible for much more than simply memory; it also governs the cognitive and functional parts of our minds, which are responsible for our thoughts and movements. Owing to the brain's extreme complexity, there are numerous classification schemes for its various functions. Still, six groups are the most prevalent divisions of the functions. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) identifies six major categories of cognitive function, albeit this framework is not exhaustive. Six major domains of cognitive function are identified by the DSM-5: language, perceptual-motor control, learning and memory, complex attention, executive function, and social cognition. We have included brief explanations of each major domain below.

- **Complex Attention:** The ability to focus on several things at once and select which ones to pay attention to and which to disregard is known as complex attention.

Although it's not something we consider often, it takes a lot of mental work to stay focused, especially when there are competing duties and distractions.

- **Executive Function:** High-level cognitive skills needed to direct and synchronize other cognitive processes and behaviors are referred to as executive functions. Put differently, these are the abilities we require to organize, set priorities, decide what to do next, react to our surroundings, and switch between jobs. This covers every step of the planning, organizing, and scheduling of task sets.
- **Learning and Memory:** The most well-known component of cognitive function is learning and memory, which is the capacity to store and recall knowledge, such as events or facts, as needed. One of the most intricate and varied cognitive domains is memory functioning, which is divided into numerous subdomains such as prospective memory, procedural memory, and working memory.
- **Language:** Our ability to communicate, whether in writing, reading, or speaking, is closely linked to language. Language abilities include things like item names, word choice, speech pattern fluidity and flow, syntax and grammar, and receptive language.
- **Perceptual-Motor Control:** Our capacity to synchronize our body's movements in reaction to our environment is known as perceptual-motor control. Put another way, it is our capacity to employ both our motor abilities and senses—such as touch and vision—to engage with the world around us.
- **Social Cognition:** The way we interpret, retain, and apply knowledge in social settings to anticipate and explain our own behavior as well as that of others is known as social cognition. This encompasses our capacity to restrain our impulses, demonstrate empathy, identify social signs, interpret facial expressions, and inspire oneself.

Skills that are connected to particular regions or neural pathways in the brain are known as neurocognitive functions. Social cognition, language, learning, memory, executive function, and perceptual-motor abilities are a few examples. Deficits in neurocognitive performance can result from brain-related medical disorders.

Neurocognitive abilities are evaluated by standardized testing. Rehabilitation can address limitations by helping a person adjust to long-term changes in these abilities or by helping them regain function that has been lost.

Cognitive talents are mental abilities that enable you to think and acquire knowledge. Neurocognitive functions are mental operations associated with certain brain regions or neural networks.

A range of cognitive functions, including memory, spatial and visual perception, language and math proficiency, and problem-solving skills, are evaluated through neurocognitive testing, also known as neuropsychological testing.

Age and medical conditions might have an impact on neurocognitive performance. As we age, neurocognitive abilities frequently deteriorate. The brain can shrink with time, and certain parts start to lose their capacity to interact with one another.

The neurocognitive abilities most frequently impacted by aging are:

- Working memory (the ability to process information as it is received)
- Attention
- Processing speed
- Planning and problem-solving
- Word recall

Many disorders affecting the brain can have an impact on neurocognitive abilities. We call these conditions neurocognitive disorders. These are illnesses that impact mental abilities because of circumstances other than mental illnesses.

The severity of a neurocognitive disease varies based on how well a person can carry out daily activities on their own. In mild circumstances, a person struggles with more sophisticated cognitive activities like budgeting. Having a mild deficiency can make it harder to do self-care activities like eating or dressing. In extreme situations, an individual cannot take care of themself.

A neurocognitive deficit is a reduction in neurocognitive function. These deficiencies may be brought on by illnesses that impact the brain or as a by product of aging.

Individuals with neurocognitive impairments may benefit from rehabilitation. Depending on the individual's unique impairments, different healthcare providers can do neurocognitive rehab.

These can include:

- Neuropsychologist
- Psychologist
- Occupational therapist
- Speech-language pathologist
- Physical therapist
- Other medical providers

Neurocognitive rehabilitation can be approached from two basic perspectives: compensatory and restorative.

- Restorative: This method aims to restore functional abilities by having patients practice increasingly difficult tasks over time.
- Compensatory: Neurocognitive deficiencies may not always be reversible. In these situations, compensatory techniques teach an individual how to enhance function by using memory aids, alarm clocks, calendars, and other forms of reminders.

Three complimentary arguments generally support the view that daily functioning is unrelated to neurocognitive aging (see, e.g., Park, 1998; Salthouse, 1990; Salthouse, 2004; Salthouse, 2010). First, it has been suggested that knowledge and personality variables play a major role in daily operations. Research has shown that although adult cognitive processing efficiency decreases, knowledge stores stay relatively stable or even rise with age (Tucker-Drob & Salthouse, 2008). Similarly, personality traits like motivation, attentiveness, and conscientiousness also rise with age (Roberts, Walton, & Viechtbauer, 2006). Second, it has been suggested that although neurocognitive processes may be

required for the early development of everyday function abilities, once these abilities are developed, they quickly become automated and are hence causally independent of neurocognitive processes. Third, it has been argued that although cognitive processing is required for everyday tasks, the amount required to succeed at them is so small that performance on everyday tasks will only be impacted by severe forms of cognitive deficits linked to dementia.

REVIEW OF LITERATURE

In their 2022 study, Hammar et al. sought to characterize the clinical neuropsychological profile of MDD and discuss its relationship to the last ten years of research on cognitive abnormalities in MDD from a state, trait, and scar viewpoint. The study concluded that characterizing the neurocognitive profiles in major depressive disorder (MDD) will have implications for the individualized assessment and management of residual cognitive symptoms, the understanding of the etiology of mood disorders, and treatments that may prevent or postpone the onset of neurodegenerative diseases.

The research on neurocognitive functioning in depressed youth aged 12 to 25 in contrast to healthy controls was compiled by Goodall et al. (2018). According to some theories, young people who are sad today exhibit a variety of neurocognitive deficits that could affect how well they respond to treatment. The results validate the necessity of taking neurocognitive functioning into account when treating depression in young people.

An overview of current developments in MBCT research was given by Kocovski et al. (2016). These included issues about the effectiveness of MBCT and its specific impacts in light of recent comparisons with structurally identical control conditions, change mechanisms, and treatment outcome modifiers. They proposed that MBCT was created as a mental health intervention for people who might experience a recurrence in depression. Even if the data supporting MBCT is encouraging, there are certain restrictions.

The first RCT on individual-based MBCT was carried out by Schroevers et al. (2015), who provide positive proof of the treatment's acceptance and practicality. After selecting a sample of diabetic patients, they examined them for psychological symptoms and contacted them about participating in the intervention trial if they showed signs of increased symptom severity. Larger trials on this alternative type of mindfulness-based therapy are supported by the preliminary results of this investigation, which revealed that I-MBCT may be linked to improvements in psychological functioning.

Preliminary evidence supporting the use of MBCT with the group of adolescents was provided by Ames et al. (2014), who modified an 8-week MBCT program for them and evaluated it using both qualitative and quantitative metrics. High levels of satisfaction with the group intervention were expressed by the participants. Semi-structured interview qualitative analysis revealed areas for this intervention's further development. Pilot data showed improvements in quality of life, rumination, and mindfulness abilities coupled with decreases in depression symptoms.

Eisendrath et al, (2014) examined the available evidence, discussed potential difficulties and changes that could help patients with treatment-resistant depression (TRD) receive effective treatment, and provided a theoretical justification for using MBCT to these patients. They

also came to the conclusion that, in terms of improving compassion and quality of life, mindfulness directly benefits healthcare professionals.

Khullar et al, (2014) examined new research showing that medication and psychotherapy target the cognitive domain explicitly and that cognitive impairment is a mediator of functional disability in MDD. The deficiencies in MDD's symptom and functional results highlight the necessity of shifting attention to other aspects of the disorder, like cognitive dysfunction, which are the main causes of functional impairment.

In their study, Raymond et al. (2014) conducted a comprehensive assessment of the literature on neurocognitive abnormalities and their potential relationship(s) to psychosocial functioning in MDD. The authors proposed that, although the evidence is of low quality, neurocognitive performance appears to be broadly related with functional impairment in patients with MDD.

In a sample of patients with Major Depressive Disorder (MDD), Omidi et al. (2013) assessed the effectiveness of Mindfulness Based Cognitive Therapy (MBCT) and Traditional Cognitive Behaviour Therapy (CBT) with Treatments as Usual (TAU) to reduce psychiatric symptoms. They found that MBCT was just as effective as CBT in treating current depression.

In order to make recommendations for future paths, C. M. et al. (2010) collected previous study data addressing neurocognitive performance in patients with MDD and varied degrees of depression severity. It was discovered that there was significant variety in the consideration of depression severity among studies, as well as a great deal of heterogeneity on depression severity-related characteristics across studies assessing neurocognitive performance in MDD. These findings point to the necessity for additional research on this crucial topic.

Sahakian et al, (2009) assessed the state of knowledge about the neurocognitive processes underlying the emergence of mood disorders in light of recent developments. They also proposed that treatment targets and future research directions were identified by combining cognitive, neuroanatomical, and pharmacological levels of research in order to identify individuals at risk, reduce the likelihood of relapse, and optimize long-term positive outcomes for those with depression.

A retrospective cross-sectional investigation of neurocognitive performance in healthy individuals and patients with depression was proposed by Benedict et al. (2006). In untreated depressed patients, researchers discovered indications of widespread cognitive impairment. Performance was enhanced but not returned to normal in patients who had received successful treatment.

The study conducted by Jaegar et al. (2005) sought to investigate the extent to which deficiencies in NC, separate from affective and psychotic symptoms, account for the functional result six months after being hospitalized for a major depressive episode. They discovered that in order to assist afflicted patients in adjusting to neurocognitively based performance deficiencies at work, home, and in the community, additional treatments—whether pharmaceutical or rehabilitative—might be necessary.

Aim

To study the effect of Mindfulness Based Cognitive Therapy on Neurocognitive Functions among patients with depression.

Objectives

- To study the effect of Mindfulness Based Cognitive Therapy on Attention & Concentration among patients with depression
- To study effect of Mindfulness Based Cognitive Therapy on Memory among patients with depression
- To study effect of Mindfulness Based Cognitive Therapy on Executive Functions among patients with depression

Hypotheses

- H01: There is no significant effect of Mindfulness Based Cognitive Therapy on Attention & Concentration among patients with depression
- H02: There is no significant effect of Mindfulness Based Cognitive Therapy on Memory among patients with depression
- H03: There is no significant effect of Mindfulness Based Cognitive Therapy on Executive Functions among patients with depression

Description of Variables

Depression:

The term "depression" is quite general and can refer to a variety of affects, mood states, disorders, syndromes, and disease states. A depressive "affect" is characterized as a fleeting, non-substantive state of feeling "depressed," "sad," or "blue." It typically arises in reaction to a particular circumstance.

A sad state is more common, more likely to be viewed as strange or uncommon, linked to negative thoughts (such as helplessness, hopelessness, and future pessimism), and may have an impact on behavior. Its fundamental component is the reduction of the person's inherent level of self-esteem, with the degree of this reduction roughly corresponding to the intensity of the mood state. In non-clinical settings, it often lasts only minutes to days and is experienced by most people.

Mindfulness Based Cognitive Therapy:

The goal of mindfulness-based cognitive therapy (MBCT) is to teach individuals who are at risk of relapsing into depression how to maintain their well-being over the long term. The University of Massachusetts Medical Center's Mindfulness-Based Stress Reduction program, created by Jon Kabat-Zinn to assist patients with persistent medical illnesses and physical pain, is the foundation of MBCT. It involves meditation techniques to assist people tune into moment-to-moment changes in the body and mind, and therefore increase their awareness of their experience in the present. The main goal of the MBCT program is to assist participants in radically changing how they relate to the ideas, emotions, and physical experiences that lead to depressive relapse. One of the most significant factors influencing this process will be the instructor's own foundational knowledge and experience.

Neurocognitive Functions:

Neurocognitive functions are cognitive abilities linked to particular brain circuits or loci that are impacted by various illness processes. When cognitive issues are suspected, testing particular neurocognitive processes can help determine which parts of the brain are involved. Neurocognitive activities are those that are directly related to the operation of certain brain regions, neural pathways, or cortical networks; these functions are ultimately supported by the neurological matrix substrate of the brain, which operates at the cellular and molecular level. As a result, their knowledge is strongly related to the fields of cognitive neuroscience and neuropsychology, which both generally aim to comprehend the relationship between the structure and function of the brain and cognition and behavior.

METHODOLOGY

This chapter includes the details about the research design used in the study, the number of samples taken, inclusion and exclusion criteria for the selection of the sample, dependent and independent variables used in the study, tools and assessments used for screening-post assessments and the procedure of the study.

Research Design

Between-Subjects Design [Forzano, F.G. (2010). Research Methods for the behavioral sciences (2nd ed.) Cengage.]

Population

The population taken for the present study was patients with Depression who fulfill the DSM- 5 criteria for Major depressive disorder, having mild to moderate level of severity and with no other comorbid psychiatric and/or medical illness.

Sample

The technique used for selection of the sample for the current study was purposive with a sample size of 30 participants (N=30). Both males and females belonging to different socio-economic status with the age of 20+ years were selected from the clinical OPDs. There will be two groups:

a. Experimental Group: 15 participants who were selected for giving the intervention.
b. Control Group: 15 participants who were not given the intervention and only the pre and post assessment was done.

Inclusion Criteria:

- Above 20 years of age
- No comorbid psychiatric Illness
- Mild to moderate level of severity of depression

Exclusion Criteria:

- Not less than 20 years of age
- Has any comorbid psychiatric Illness
- Has severe level of severity of depression

Variables

- Independent Variable- Depression and Mindfulness Based Cognitive Therapy will be independent variable.

- Dependent Variable- Neurocognitive Functions (Attention & Concentration, Memory, Executive Functions) will be a dependent variable.

Tools and Assessment Used:

i. Informed consent form
ii. Semi structured Performa for socio-demographic details
iii. Beck Depression Inventory (BDI-II)

Developed by Beck, Steer, and Brown, the BDI-II is a popular 21-item self-report measure that assesses the severity of depression in adults and adolescents. In 1996, the BDI-II was updated to better align with the DSMIV criteria for depression. For instance, instead of using the one-week timeframe seen on the BDI, respondents are asked to answer each item based on a two-week period. Many studies support the validity and reliability of the BDI-II in a variety of demographic and cultural contexts. It is commonly used as a measure of the severity of depression, not as a diagnostic tool. It has also been applied to a large number of treatment outcome studies as well as studies involving people who have experienced trauma. The age range for the same is 13 years – 80 years.

iv. Mindfulness Based Cognitive Therapy (MBCT)

In order to prevent relapse, a particular type of group training called mindfulness-based cognitive therapy is used with patients who have depression (mostly major depression) (Barnhofer et al., 2009; Crane, 2009; Segal, Teasdale, & Williams, 2004; Segal, Williams, & Teasdale, 2002; Williams, Teasdale, Segal, & Kabat-Zinn, 2007). The goal of this method is to assist clients in altering the way they respond to their negative thoughts (as well as feelings and physical sensations). They decenter their thinking to do this. Decentering is the recognition that ideas are not reality; they are only thoughts (Spiegler & Guevremont, 2010). For instance, if you think, "I am lazy," it is only a notion and not a true representation of who you are. You can get detached from and disengaged from the notion by engaging in mindfulness practices. A depressed person may perceive this as an indication that depression may be starting if they become increasingly conscious of or aware of thoughts similar to these. People can avoid relapsing into depression by becoming conscious of these thoughts (Spiegler & Guevremont, 2010).

v. Stroop Neuropsychological Screening Test (SNST)

The SNST evaluates cognitive processing in about five minutes and offers insightful information on brain dysfunction, cognition, and psychopathology—all of which have an impact on a person's capacity to manage cognitive stress and comprehend complicated information. The outcomes can indicate that more targeted testing is necessary.

- The Color Task requires the performer to read out a list of color names while none of the names are printed in the corresponding color. The person identifies the color of ink used to print the color names in the Color-Word Task.
- Two age groups—18–49 years old and 50 years and older—each have their own set of norms.

Over 79% of persons with brain injury may be accurately distinguished from normal adults using this test. Reliability between tests is.90.

Max R. Trenerry, Bruce Crosson, James DeBoe, and William R. Leber are the authors of SNST. The same is available in the age range of 18 to 79.

vi. P.G.I Memory Scale (PGIMS)

In 1977, the PGI memory scale was developed and standardized. The PGI Memory Scale has gained popularity in India and has taken the place of the Boston Memory Scale and Wechsler Memory Scale at two of the country's top mental health institutions: the Central Institute of Psychiatry in Ranchi and the National Institute of Mental Health and Neuro Sciences in Bangalore.

A component of the Battery of Brain Dysfunction is the PGI-Memory Scale. Based on neurological theory, the PGI Memory Scale (PGIMS) offers a comprehensive and user-friendly scale for measuring verbal and nonverbal memories; very short term, short term, and long-term memories based on experimental evidence; and remote, recent, and immediate memories based on clinical memory evaluation practice. It contains 10 subtests –

1. Remote memory
2. Recent memory
3. Mental balance
4. Attention
5. Delayed recall
6. Immediate recall (sequential reproduction of sentences
7. Retention for similar pairs
8. Retention for dissimilar pairs
9. Visual retention
10. Recognition

vii. Trail Making Test (TMT)

Ralph Reitan, an American neuropsychologist regarded as one of the founding fathers of clinical neuropsychology, developed the exam. 1944 saw the use of the exam. A quick paper-and-pencil neuropsychological test called the Trail Making Test (TMT) is frequently used to check for cognitive impairment. A common element of the Halstead- Reitan Battery, which assesses cognitive impairment, was the TMT. Certain authors read Part B of the TMT as an executive task. Psychomotor speed and the effectiveness of visual scanning appear to be the main determinants of Part A. Part B, on the other hand, is made up of circles, some of which have letters and some of which have numbers. It is believed that the switching between serial sequences of letters and numbers calls for more working memory and flexibility in thought processes related to executive control.

Procedure

The study is a pre-test- post-test design and was conducted in 3 phases.

1. In first phase, the participants were contacted and were briefly informed about the study. Patients who fulfilled the criteria for both the groups were selected and neurocognitive impairments were assessed using P.G.I Memory Scale (PGIMS), Trail Making Test (TMT), and Stroop Neuropsychological Screening Test (SNST).
2. In the second phase of the study, intervention through Mindfulness Based Cognitive Therapy was provided only to the selected participants of the experimental group.
3. In the final phase, neurocognitive impairments were assessed using P.G.I Memory Scale (PGIMS), Trail Making Test (TMT), and Stroop Neuropsychological Screening Test (SNST) again applied on the participants of both the groups.

Intervention Process

The study involved giving intervention using Mindfulness Based Cognitive Therapy (MBCT) for a total of 14 sessions. Total length of time in treatment was 8 weeks. Subjects underwent MBCT sessions for 60 minutes at least twice weekly.

All the participants of experimental group received the MBCT sessions of 60 min each, administered twice a week, over 8 weeks. After the completion of the 14 sessions, all the tests are re-administered on both the groups.

RESULTS

This section explains about the analysis of the results obtained from the study. The statistical analysis which is used to analyse the data includes the use of descriptive statistics-Mean and Standard deviation. Paired t -test is used to determine if the mean of the pre-test scores is significantly different than the mean of their post-test scores by testing if the mean difference in scores for these subjects was different from zero for both the experimental and control group. Independent t-test is used to compares the means of experimental and control group in order to determine whether there is statistical evidence that the associated means of both the groups are significantly different.

The data received from both experimental group and control group of post-test and pre-test was organized and analysed in Microsoft Office Excel 2022.

Table 1: Control Group

	Pre-Test		**Post-Test**					
	M	**SD**	**M**	**SD**	**df**	**t**	**p**	**σ**
TMT	0.13	0.35	0.60	0.51	28	2.928	0.0067	0.159
SNST	86.53	5.59	102.27	4.28	28	8.650	0.0001	1.819
PGI-MS	26.64	4.88	8.00	10.14	28	6.423	0.0001	2.906

The above table shows the significant difference in the pre-test and post-test scores of the control group. The p value of TMT is 0.0067 and standard error of difference = 0.159. The p value of SNST is 0.0001 and standard error of difference = 1.819. The p value of PGI-MS is 0.0001 and standard error of difference = 2.906. The mean difference with S.D. was obtained with a 95% confidence interval. The t value is significant at 0.05 level.

Table 2: Experimental Group

	Pre-Test		**Post-Test**					
	M	**SD**	**M**	**SD**	**df**	**t**	**p**	**σ**
TMT	0.20	0.41	1.00	0.00	28	7.483	0.0001	0.107
SNST	86.07	5.82	102.93	3.63	28	9.515	0.0001	1.773
PGI-MS	27.33	4.58	0.00	0.00	28	23.127	0.0001	1.182

The above table shows the highly significant difference in the pre-test and post-test scores of the experimental group. The p value of TMT is 0.0001 and standard error of difference = 0.107. The p value of SNST is 0.0001 and standard error of difference = 1.773. The p value of PGI- MS is 0.0001 and standard error of difference = 1.182. The mean difference with S.D. was obtained with a 95% confidence interval. The t value is significant at 0.05 level.

Table 3: Both the groups Post test

	Post-Test Control Group		Post-Test Experimental Group					
	M	**SD**	**M**	**SD**	**df**	**t**	**p**	**σ**
TMT	0.60	0.51	1.00	0.00	28	3.05	0.0049	0.013
SNST	102.27	4.28	102.93	3.63	28	0.45	0.649	1.451
PGI-MS	8.00	10.14	0	0	28	3.05	0.0049	2.614

The above table shows the extremely significant difference in the post-test scores of the control group and experimental group. The p value of TMT is 0.0049 and standard error of difference= 0.013. The p value of SNST is 0.649 and standard error of difference = 1.451. The p value of PGI-MS is 0.0049 and standard error of difference = 2.614. The mean difference of TMT=0.60, SNST=102.27, PGI-MS=8.00 of control group; TMT = 1.00, SNST = 102.93, PGI-MS = 00 of experimental group with S.D. of TMT = 0.51, SNST = 4.28, PGI-MS = 10.14 of control group; TMT = 0.00, SNST = 3.63, PGI-MS = 00 of experimental group and t value of TMT = 3.05, SNST = 0.45, PGI-MS = 3.05 was obtained with a 95% confidence interval. The t value is significant at 0.05 level.

DISCUSSION

This research was conducted to assess the effect of Mindfulness Based Cognitive Therapy on Neurocognitive Functions among patients with depression. The sample selected for the study was a total of 30 patients diagnosed with depression. The study was qualitative in nature. The locale for the same was psychological OPDs from Delhi/NCR. The population taken for the present study was patients with Depression who fulfill the DSM-5 criteria for Major depressive disorder, having mild to moderate level of severity and with no other comorbid psychiatric and/or medical illness. The technique used for selection of the sample for the current study was purposive with a sample size of 30 participants (N=30). Both males and females belonging to different socio-economic status with the age of 20+ years were selected from the clinical OPDs. The study is a pre-test- post-test design and was conducted in 3 phases. Initially, the participants were contacted and were briefly informed about the study. Patients who fulfilled the criteria for both the groups were selected and BDI was conducted on them. The standardized tools used in order to assess neurocognitive impairments from the target population were namely P.G.I Memory Scale (PGIMS), Trail Making Test (TMT), and Stroop Neuropsychological Screening Test (SNST).

Thereafter, intervention through Mindfulness Based Cognitive Therapy was provided only to the participants selected for the experimental group. This was a 8 week program done on the individual basis. Later, neurocognitive impairments were again assessed using P.G.I Memory Scale (PGIMS), Trail Making Test (TMT), and Stroop Neuropsychological Screening Test (SNST) on all the participants of both the groups.

The term "depression" is fairly broad and can refer to sickness states as well as affective states, temperament states, syndromes, or diseases. A depressed "affect" is defined as a fleeting, inconsequential state of feeling "discouraged," "depressed," or "blue" and typically occurs in relation to a certain situation. A sad mental state is more likely to occur, is likely to be regarded as unusual or abnormal, is linked to negative thoughts (such as helplessness, hopelessness, and future negativity), and may have an effect on behavior. Its fundamental component is the reduction of the person's inherent level of self-esteem, with the degree of this reduction roughly corresponding to the intensity of the mood state.

Neurocognitive functions are cognitive traits associated with distinct illness processes that are linked to particular brain pathways or locations. When cognitive problems are suspected, certain neurocognitive tests can be used to determine which brain regions are involved. Neurocognitive functions are mental aptitudes that are closely linked to the capacities of particular brain regions, processes, or cortical networks; these capacities are ultimately supported by the neurological framework that underlies the cerebrum (for example, at the cellular and subatomic level). Their understanding is thus closely related to the fields of cognitive neuroscience and neuropsychology, which both aim to fully understand the relationship between cognition and behavior and the structure and function of the brain.

Mindfulness-based cognitive therapy (MBCT), a new kind of psychotherapy, has shown promise in treating serious depression, anxiety, and substance dependence, among other comorbid and related conditions. The intervention's theoretical underpinnings suggest that either a rise in mindfulness or a fall in unfavorable, repetitive thoughts could serve as potential change mechanisms. For a range of psychological problems, mindfulness-based therapies offer an evidence-based, mind-body complementary treatment approach. Giving individuals the tools they need to deal with depression symptoms as they arise is the aim of MBCT. Those that are adept at these abilities might be able to rely on them in stressful situations or emergency situations. This knowledge could facilitate the healing process by teaching people how to counterbalance bad feelings with positive thinking.

According to hypothesis 1 there is no significant effect of Mindfulness Based Cognitive Therapy on Attention & Concentration among patients with depression. But the results show significant effect of Mindfulness Based Cognitive Therapy on Attention & Concentration among patients with depression. There are very limited studies that have shown this result.

According to hypothesis 2 there no significant effect of Mindfulness Based Cognitive Therapy on Memory among patients with depression. But the results show significant effect of Mindfulness Based Cognitive Therapy on Memory among patients with depression. There are very few studies that have shown this result.

According to hypothesis 3 here is no significant effect of Mindfulness Based Cognitive Therapy on Executive Functions among patients with depression. But the results show significant effect of Mindfulness Based Cognitive Therapy on Executive Functions among patients with depression. There are very limited studies that have shown this result.

SUMMARY AND CONCLUSION

The purpose of the current study was to investigate how mindfulness-based cognitive therapy affected the neurocognitive functions of depression patients. Every condition is treated with the goal of getting patients back to their best level of functioning in addition to relieving their symptoms. The results of this study demonstrated that MBCT training improved neurocognitive abilities in depressed people. The results of the current investigation showed that a treatment intervention for enhancing neurocognitive functions can be Mindfulness Based Cognitive Therapy (MBCT). This study has to be repeated with a bigger sample size and a longer follow-up period. It is important to evaluate improvements in neurocognitive abilities obtained by MBCT across major depressive disorder subgroups.
Based on the aforementioned data, it can be said that MBCT significantly improves neurocognitive deficits in depressed patients, including those related to attention, language, spatial cognition, memory, and executive functioning.

Future Implications

Individual studies examining neurocognitive impairments associated with MDD are very less. Studies have used different assessments but the current study has used different assessments such as P.G.I Memory Scale (PGIMS), Trail Making Test (TMT), and Stroop Neuropsychological Screening Test (SNST) for the pre and post assessment which can be further used in other researches.

As noted earlier, MBCT has been used in many studies, this study provides evidence of effectiveness of MBCT as an intervention with patients with depression. The study gives researchers idea to work more in the area.

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Acknowledgment

The author(s) appreciates all those who participated in the study and helped to facilitate the research process.

Conflict of Interest

The author(s) declared no conflict of interest.

How to cite this article: Mittal, P. (2024). Effect of Mindfulness-Based Cognitive Therapy on Neurocognitive Functions Among Depression Patients. *International Journal of Indian Psychology*, *12*(1), 1378-1399. DIP:18.01.130.20241201, DOI:10.25215/1201.130