Rewiring the mind, not just the motor recovery in chronic Stroke survivors: A narrative review of the psychological experiences during the neurological rehabilitation.

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ABSTRACT:

Incidents of Cerebro-vascular Accidents or Stroke are increasing day by day for poor life style. On other side the survivors had the consequence of hemiplegia where they go depended and such patients turn to be a burden for the family and society. Modified Constraint Induced Movement Therapy (mCIMT) is a potential Neuro-rehabilitation technique for such cases. There some studies that highlight the success of the intervention in enhancing motor improvement in even chronic patients. However, the psychological effects of mCIMT are not much discussed. This narrative review study is an attempt to explore the psychological effects of mCIMT especially in chronic hemiplegics. The study shall also examine the influence of the approach on the patient's motivation, self-efficacy, emotional wellbeing, involvement and quality of life. The outcome shall be helpful in optimizing the technique and to capitalize the holistic benefits of this proficient rehabilitation approach.

Drawing from the quantitative evidence, this review highlights that mCIMT has a two-sided psychological impact. It is found to be considerably boosted the mood, self- reliance and psychological well-being of the patient. At the same time the rigorous and the challenging nature of the therapy may direct to disappointment and reduced patient involvement to continue the session. The therapist needs to ensure the balance which shall be crucial for the success of the intervention and to gain the best physiotherapeutic and the psychological benefit in terms of functional recovery with the approach.

In conclusion, mCIMT is a comprehensive rehabilitation approach that promotes both physical recovery and psychological well-being in chronic stroke patients. By improving motor function, confidence, emotional health, and daily participation, it helps patients achieve greater independence, self-belief, and an enhanced quality of life.

KEYWORDS:

Stroke, Cerebro-vascular Accident, Psychological Effects, Modified Constraint Induced Movement Therapy (mCIMT), Hemiplegics, Chronic Stroke, Neuro- Rehabilitation, Neuro- Physiotherapy, Motivation, Self-Efficacy, Learned Non-Use, Anxiety and Depression, Independence, Emotional Wellbeing, Quality Of Life,

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INTRODUCTION:

Stroke or Cerebro-vascular Accident (CVA) is a neurological condition caused by the interruption of the blood supply to various parts of the brain. This can pilot to motor-sensory deficits leading to functional impairments, cognitive and emotional impairments. Severe stroke can even result in Coma or Death. However, the survivors with hemiplegia can have secondary psychological challenges such as:

Anxiety,

Depression,

Frustrations,

Poor motivation,

Less self-esteem,

Learned Non-use…

These negative psychological developments can impact the rehabilitation and its outcome. Among these "learned non-use" in chronic patients is one of the major consequences, a conditioned suppression of movement where patients cease attempting to use their affected paretic limb due to early post-injury failures and a subsequent reliance on the healthy compensatory limb (Miltner et al., 1999).

MODIFIED CONSTRAINT-INDUCED MOVEMENT THERAPY (mCIMT):

mCIMT is an operative intervention introduced by Dr. Edward Taub. The conventional approach well known as Constraint-Induced Movement Therapy is customized by its parameters to enhance its efficiency. It constrains the lesser impaired or sound side limb while forcing the task oriented repetitive practices for the hemiplegic side, promoting the functional motor recovery. It is frequently used for CVA, Cerebral Palsy, and Post-Traumatic Brain Injury

the modern mCIMT treatment protocol often advocates the restrictive constraints for up to 90% of active day hours. The intensive task-oriented rehabilitation under the guidance of a Physiotherapist shall extent 1 to 2 hours, 5 days a week. Depending upon the severity, the total session shall last up to maximum of 10 weeks.

The research publications comparing the original Constraint-Induced Movement Therapy (CIMT) verses Modified Constraint-Induced Movement Therapy (mCIMT) in adult chronic stroke survivor's highlights the best results in the latest mCIMT approach that as a longer course of rehabilitation that boosts the neuro-plasticity leading to sustained functional recovery.

PSYCHOLOGICAL EFFECTS OF mCIMT:

1. **Improvement in Self - Efficacy**:

The patient is properly counselled before the task and was introduced to other previous success model that promotes their belief in their potentiality to perform their given task more successfully. The rehabilitation sessions had more task-oriented exercises that give a weight-age of recently applicable functional outcome. The expert guidance and positive feedback throughout the neuro-physiotherapy duration also enhance the hemiplegics self -efficacy. the patient observes the day-to-day improvements and that adds to the self-determined workouts. Clinically the patients had displayed the enhanced adherence to the rehabilitation approach, with excessive motivation and long term committed recovery behaviour.

The behavioural components incorporated within the mCIMT "transfer package," including behavioural contracts, home practice diaries, and collaborative problem-solving, are specifically designed to strengthen this cognitive connection.

By observing both qualitative progress through assessment tools such as the Motor Activity Log (MAL) (Cao & Li, 2021), patients become actively involved in tracking their own recovery journey. This process of self-monitoring enhances task-specific self-efficacy. The patient gradually discovers the continues and remarkable motor recovery in terms of their functional capacity. This in turns subsidise their uncertainties related to poor balance, decline in their gained functional independence or isolation in the society.

2. **Depression or anxiety reduction**:

Due to functional difficulties, the patient experiences depressive symptoms from dependency as the illness worsens. The literature studies make it abundantly evident how mCIMT will lessen dread of using the afflicted limb, worry about movement performance, and mental suffering. The intervention's beneficial effects have an impact on emotional state and mood. Improved independence, more social interaction, positive reinforcement during therapy, and the joy of accomplishments are all potential explanations.

Stroke survivors frequently experience emotions of dependency, helplessness, and low self-worth as a result of their continuous struggles with basic everyday tasks like eating and dressing. mCIMT can result in significant secondary psychological effects by improving hand function and independence in activities of daily living (ADLs) (Ju & Yoon, 2018). Many patients report lower levels of depression symptoms after intervention, which may be related to greater engagement in everyday activities, restored independence, and resumed behavioural activation.

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3. **Quality of Life: Beyond Motor Recovery:**

Stroke is a major cause of disability and has implications that are far-reaching in terms of physical impairment, independence, social participation, emotional health and general quality of life. In recognition of this, the World Health Organization has underlined that evaluation of rehabilitation program should not only consider motor recovery but also their ability to improve participation, psychological health and quality of life in terms of their physical condition. Therefore, rehabilitation should target the full person rather than the injured limb alone.

However, despite this guidance there is a considerable gap in the available data. There were no trials that clearly measured quality-of-life measures or psychosocial impact in a recent review of 14 RCTs of Constraint Induced Movement Therapy (CIMT). This points to an important gap in stroke rehabilitation research which has focused largely on physical results, neglecting emotional and social elements of recovery that are under-researched.

However, study into these more broad results has shown positive results. Modified constraint induced movement therapy (mCIMT) has been demonstrated to improve upper limb motor performance, everyday functional abilities, and physiological elements of health related quality of life in older stroke survivors. Patients reported feeling more independent and content with their life since they could conduct daily duties more effortlessly.
Similar findings were reported in trials that used mCIMT to the lower limbs, which used recognized metrics such as the Stroke Impact Scale and the Stroke Specific Quality of Life Scale, and showed improvements in functional capacity and quality of life. The results suggest that the effects of mCIMT are not limited to individual motor improvements but have a considerable overall impact on post-stroke living. Also, blinded randomized clinical trials have shown that CIMT significantly improves functional performance and quality of life in patients with chronic hemiparesis.

The association between mCIMT and improved quality of life is probably complex. One of the key mechanisms is the restoration of functional independence. As patients regain the ability to use the affected limb, they are better able to do daily tasks such as eating, dressing, grooming and household chores. And the reduction of dependency often makes a real psychological difference.

Another key aspect is the enhancement of self-efficacy. Patients succeed in therapy over and over again, and they come to trust themselves. This renewed sense of competence often extends beyond motor activities and has a positive effect on motivation, social interaction and emotional resilience. Doing useful things is also a good way to fight despair and helplessness which sometimes accompany the melancholy of stroke.

The goal-oriented and planned nature of mCIMT also stimulates behavioral engagement and active participation in rehabilitation. Patients typically feel a sense of success when they witness measurable progress in their treatment. Such uplifting experiences can improve mood, relieve emotional discomfort and help to create a more positive outlook in terms of healing and daily life.

Overall, the evidence suggests that mCIMT improves quality of life, psychosocial adjustment, and emotional well-being, in addition to motor rehabilitation. Future rehabilitation research should therefore concentrate more on patient-centred outcomes as well as established indicators of psychological health, participation and life satisfaction.

4. Peer Motivation in Group Formats:

Recent breakthroughs in mCIMT based on social groups have pointed to the importance of social interaction and peer influence during recovery. The psychological climate is more supportive and engaging in a group environment.

Peer Support as a Motivational Trigger: Group-based mCIMT creates an environment of peer support, mutual understanding and positive social comparison. Patients can benefit greatly from the emotional support of contact with others who have been through similar problems and recuperation

Higher Therapist and Patient Engagement: Therapists typically note that group sessions are correlated with greater patient motivation and continuous attendance. Seeing other people with similar chronic disabilities succeed in the shaping activities is a powerful vicarious motivator to lessen the emotional cost of the challenging nature of the therapeutic protocol.

NEUROPSYCHOLOGICAL BASIS OF PSYCHOLOGICAL IMPROVEMENT:

The psychological benefits noted after modified Constraint Induced Movement Therapy (mCIMT) are thought to be intimately tied to the brain's amazing ability to restructure and adjust, a process known as neuro-plasticity. Following stroke, disrupted neurological circuits often restrict movement, confidence and involvement in daily life. mCIMT, however, facilitates physical and psychological rehabilitation by helping the brain to create new neural connections and reinforce existing ones through repetitive, purposeful use of the damaged limb.

One of the primary processes of mCIMT is repetitive task-oriented practice. The therapy involves frequent use of the paretic limb in meaningful functional activities to promote cortical restructuring in the brain. Areas of the motor cortex that may have become underactive after stroke are gradually awakened, enabling patients to regain more control and coordination of movement. This brain remodelling is important to recovering functional ability.

In addition to cortical remodeling, mCIMT improves motor learning through reinforcement of

repeated successful movement patterns. Constant repetition allows the brain to re-learn motor abilities that may have been lost after a stroke. As patients start to do better, they begin to have confidence and motivation, which helps them participate more in therapy and everyday activities.

The therapy also fosters sensori-motor integration, which is the capacity of the brain to connect sensory information with motor responses. Better integration allows the patient to better comprehend the sensory feedback from the afflicted limb and respond with more accurate and regulated motions. This not only helps with physical recuperation but also a stronger sense of bodily awareness and control.

Importantly, the benefits of neurological rehabilitation are not confined to motor performance. As patients develop independence of function and are able to participate more in daily activities, there may also be substantial emotional and cognitive improvement. Greater autonomy tends to lessen the feeling of dependency, helplessness and social isolation. When patients become more active participants in their life and rehabilitation process, they can gain higher self-esteem, better mood and more cognitive engagement.
Hence, cognitive effects of mCIMT are indicative of an interrelated process where gains in brain function, movement, mental health, and involvement mutually reinforce each other and ultimately contribute to more holistic recovery in chronic stroke survivors.

ROLE OF PHYSIOTHERAPISTS AND THE REHABILITATION TEAM:

Healthcare providers have an important role in improving the physical, as well as the psychological and emotional effects of modified Constraint-Induced Movement Therapy (mCIMT). Given the many physical, emotional, cognitive and social challenges encountered during the recovery from chronic stroke, the support from the rehabilitation team is vital to keeping patients motivated, confident and actively involved in the recovery process.
Physiotherapists in particular are facilitators of motor and psychological healing. Using systematic therapeutic activities, continual encouragement and individualized supervision, they help patients to overcome the anxiety, frustration and learned non-use that are part of chronic stroke. The therapy transaction itself usually provides a huge amount of emotional support and reassurance for patients who may have difficulty with dependency and poor self-confidence.

Patient counselling is one of the most important roles of the rehabilitation team. Many stroke survivors have worry, melancholy, pessimism or fear of failing throughout rehabilitation. Counselling and empathetic communication assist patients to understand better the recovery process, to create realistic expectations and to have a more positive approach towards therapy and daily life.

Another key technique used in mCIMT is positive reinforcement. Small improvements in mobility or ability to accomplish tasks can have tremendous effect on patient confidence and self-efficacy. Continuous encouragement encourages patients to continue doing difficult tasks and increases active participation in rehabilitation activities.

Family education is also crucial for optimal rehabilitation. Family members and care givers must be aware of the goals, concepts and obstacles of mCIMT in order to provide emotional support and promote continued use of the damaged limb outside of therapy sessions. Educated caregivers can provide a supportive home atmosphere that encourages independence and discourages overprotection that might reinforce learned non-use.
Goal setting is equally as important in sustaining patient engagement. The goals should be meaningful, realistic and attainable for the patient to track their progress and have a sense of accomplishment during the rehabilitation process. Short-term goals can help keep you motivated right away, and long-term goals can help keep you devoted to recovery.

Motivation enhancement is another important aspect of recovery. mCIMT is physically and emotionally hard for patients and therapists employ motivational techniques to enhance adherence and minimize dissatisfaction. The use of encouragement, modifications of tasks, practical activities, and patient-centered strategies can promote engagement and make therapy more meaningful and satisfying.

It is also crucial to track emotional well-being, as part of healing. We advise healthcare staff to periodically assess patients for signs of emotional distress, fatigue, anxiety or despair that may interfere with healing. Psychological disorders identified early on facilitate intervention and improve overall rehabilitation outcomes.

It is vital to highlight that successful stroke recovery entails a multidisciplinary effort. Physiotherapists work in multidisciplinary teams with psychologists, occupational therapists, speech therapists, physicians, nurses and caretakers to address the patient's diverse needs. Physiotherapists seek to improve motor recovery and functional training, psychologists help with emotional adjustment, occupational therapists work to maintain independence in daily activities and

caregivers provide constant support in the home environment.

This collaborative and holistic approach ensures that rehabilitation is not just about physical recovery and includes the emotional, cognitive, behavioural and social aspects of life after a stroke. The efficacy of mCIMT and long-term Quality of Life of chronic hemiplegic patients may be significantly enhanced by the combination of physical therapy with psychological support and family engagement.

REVIEW METHODOLOGY:

a) Search Strategy:

The aim of this narrative review technique was to evaluate the psychological impact of modified Constraint-Induced Movement Therapy (mCIMT) on chronic stroke survivors during the course of neurological recovery. A comprehensive literature search and critical evaluation was performed to identify research related to the effects of mCIMT on psychological variables such as self-efficacy, motivation, emotional well-being, anxiety, depression, participation and quality of life. The integration of the quantitative and qualitative findings provided a more complete picture of the psychosocial effects of mCIMT.

b) Databases Searched

The literature search was conducted using the following electronic databases from Google Scholar, Scopus, Research Gate, Science Direct, etc. Additional relevant references were identified manually from the reference lists of identified studies.

c) Inclusion Criteria

- Studies were included in the review if they met the following criteria:
- Studies involving adult stroke survivors with chronic hemiplegia or hemiparesis
- Research focusing on Modified Constraint-Induced Movement Therapy (mCIMT) or Constraint-Induced Movement Therapy (CIMT)
- Studies reporting psychological, emotional, behavioural, motivational, or quality-of-life outcomes
- Randomized controlled trials, clinical trials, pilot studies, observational studies, and review articles
- Articles published in English language
- Full-text articles available for review.

d) Exclusion Criteria

- Studies involving pediatric neurological disorders only
- Articles focusing solely on biomechanical or motor outcomes without psychosocial relevance
- Conference abstracts without complete data
- Non-English publications
- Duplicate studies and unpublished manuscripts
- Studies lacking sufficient methodological clarity or relevance to the review objectives.

e) Keywords Used

The keywords and combinations were used during the literature search were “Modified Constraint-Induced Movement Therapy”, “mCIMT”, “Constraint-Induced Movement Therapy”, “Stroke Rehabilitation” , “Chronic Stroke”, “Hemiplegia”, “Neuro-rehabilitation”, “Psychological Effects”, “Self-Efficacy”, “Depression in Stroke”, “Anxiety after Stroke”, “Quality of Life”, “Learned Non-Use”, “Motivation in Rehabilitation”, “Emotional Well-being”, “Neuro-plasticity”. Boolean operators such as AND, OR, and NOT were used to refine the search results.

f) Study Selection Process

Relevant publications about mCIMT and stroke rehabilitation were found by the first database search. Relevance to the psychological and psychosocial outcomes of rehabilitation was taken into consideration while screening titles and abstracts. After then, full-text articles that satisfied the inclusion requirements underwent critical evaluation. Excluded were studies that mainly addressed motor recovery without taking behavioral or emotional factors into account. In accordance with the primary psychological constructs established, pertinent data from the chosen research was retrieved, compared, and narratively synthesized. Kindly refer the Fig: 01- Data sheet for the finalized review list, on the psychological effect of mCIMT.

g) Review Timeframe

The review incorporated existing studies on psychological and psychosocial impacts of mCIMT in chronic stroke rehabilitation, as well as literature on CIMT from its initial phases, published from 1993 to 2026.

Summary of Studies on Psychological Effects of mCIMT

Author & Year	Population	Intervention	Psychological Variable Studied	Assessment Tool Used	Key Findings
Page et al., 2001	Chronic stroke survivors	Modified CIMT	Motivation & limb use	Motor Activity Log (MAL)	Improved functional use and adherence
Ju & Yoon, 2018	Chronic stroke patients	mCIMT	Depression	Depression assessment scale	Reduced depressive symptoms post-intervention
Cao & Li, 2021	Post-stroke patients	mCIMT	Psychological recovery & self-efficacy	MAL and clinical assessments	Enhanced confidence and motor participation
Dettmers et al., 2005	Stroke survivors	Distributed CIMT	Quality of life	Stroke Impact Scale	Improved QoL and functional independence
Lin et al., 2009	Chronic stroke patients	CIMT vs control	Daily function & psychosocial outcome	QoL measures	Better participation and emotional adaptation
Uswatte et al., 2005	Chronic hemiparetic patients	CIMT	Real-world arm use	MAL-14	Improved spontaneous limb use

Fig: 01- Data extraction sheet

DISCUSSION:

Modified constraint-induced movement therapy (mCIMT) has evolved from a mere therapy to promote motor recovery in chronic stroke patients. Its ultimate importance is in its capacity to link physical rehabilitation with psychological repair. Standard outcome measurements are often based on changes in joint mobility, grip strength or functional hand use. Yet, the deeper impact of mCIMT is in its potential to modify the mentality of the survivor and restore confidence in their normal life.

Learned non-use and helplessness are among the most devastating consequences of chronic stroke. Patients avoided using the damaged limb totally as a result of repeated failures of functional activities over time, eventually increasing dependency, frustration and emotional isolation. mCIMT breaks this pattern by systematic use of the paretic limb regularly during purposeful, ordinary activities. This build-up of little but substantial wins that the patients experience slowly re-builds their confidence in their own capabilities resulting in increased self-efficacy and emotional resilience. Also worth noting are the psychological consequences of mCIMT. Having more independence in your daily activities often helps to reduce symptoms of depression, enhance motivation and participation and improve the overall quality of your life. This therapy enables brain restoration, emotional and social reintegration via behavioural activation, methodical task practice and continuous involvement. In many cases patients gain a new discovered sense of autonomy and dignity which becomes a fantastic motivator to continue treatment.
However, these encouraging results call for further scientific research to better understand the full psychological impact of mCIMT. Future studies should include large scale randomized control trials, including standard neuropsychological testing with traditional physical rehabilitation outcomes. The studies will enhance knowledge of the emotional, cognitive and behavioural changes associated with mCIMT and help to maximize its application within comprehensive stroke rehabilitation courses.
mCIMT is a holistic rehabilitation approach for physical and psychological aspects of chronic stroke recovery. It gives stroke survivors more than better movement, but a new sense of optimism, confidence and quality of life by improving motor function, emotional well-being and self-belief simultaneously.
Modified Constraint-Induced Movement Therapy (mCIMT) has evolved from a motor rehabilitation technique to an ever-increasing comprehensive therapy intervention that addresses both the physical and the psychological impacts of chronic stroke. This therapy is well known for improving upper limb function, coordination and motor performance, but the total impact on emotional well-being and psychosocial recovery is also essential.
Stroke survivors are left not only with physical impairment but also with sentiments of dependency, irritation, concern, lost confidence and learnt non-use. Such emotional problems could have a detrimental impact on the engagement in rehabilitation and the quality of life in general throughout the period. mCIMT is crucial to break this cycle by promoting active functional use of the limb in a consistent, deliberate and goal-directed way. As patients begin to develop functional capacities, they also experience incremental gains in confidence, motivation and emotional resilience.
One of the most prominent psychological outcomes of mCIMT is the enhancement of self-efficacy. Successful repetition of tasks helps patients develop confidence in their abilities, which in turn promotes their independence in performing daily chores. This understanding often translates into more participation in therapy, greater social functioning, and a more optimistic attitude towards recovery. Also, the therapy helps improve emotional health by reducing feelings of helplessness, dread and depressed tendencies that usually accompany chronic stroke.

The beneficial benefits of mCIMT generalize to overall quality of life. More autonomous and functional patients feel more comfortable participating in family, social and community activities. Emotional fulfillment and psychological well-being are strongly tied to the return of autonomy and involvement. Importantly, the therapy restores not just movement, but dignity, confidence and optimism.

However, more than physical training is needed to optimize the benefits of mCIMT. Further improvement in treatment results may be achieved by psychological assistance, patient counselling, motivational methods, family participation and emotional monitoring in rehabilitation programs. Physical rehabilitation together with psychological

care in a holistic patient-centred approach can enhance long-term healing and improve the rehabilitation experience for stroke survivors.

FUTURE PERSPECTIVES

Modified CIMT has demonstrated promise in physical and psychological benefits in chronic stroke rehabilitation; however there are certain key aspects that need to be investigated further in a scientific approach. Future research must extend beyond short-term motor outcomes to focus instead on a better understanding of the effects of mCIMT on emotional, cognitive and psychosocial recovery over time.

Long-term psychological impacts of mCIMT are important areas for further investigation. While many studies report immediate gains in motivation, self-efficacy, mood and engagement after intervention, little is known about whether these gains last months or years after therapy completion. Longitudinal studies are also needed to establish the sustainability of psychological advantages and the effect on long-term quality of life, social reintegration and independence of stroke patients.

Another important aim is to determine the optimal intensity and duration of mCIMT. This regimen is beneficial but can be taxing and may lead some patients to become weary and dissatisfied or less adherent. Future studies should explore the optimal threshold of therapeutic intensity, patient tolerance and psychological state. Treatment regimens tailored to the patient's degree of severity, cognitive status, emotional resilience, and motivation may help to improve compliance and optimize results.

Future research should also evaluate the efficiency of psychological therapy in combination with physical rehabilitation techniques. The combination of mCIMT with other approaches such as cognitive behavioural therapy, motivational interviewing, mindfulness-based therapies, stress management or counselling may increase emotional adjustment and involvement in rehabilitation. This is particularly helpful for stroke survivors who may be experiencing a sense of despair, worry, fear of failure or learned helplessness.

In addition, future clinical studies should emphasize the assessment of emotional and psychosocial outcomes with the use of standard psychological assessment methodologies. Much of the current research is focused on physical recovery such as motor function and limb use, with mental health often underreported. Validated measures of sadness, anxiety, self-efficacy, quality of life, participation and emotional resilience could be utilized to better understand patient recovery in a more holistic way.

There is also a need for sound methodological designs of large scale randomized controlled studies to enhance the knowledge base surrounding the psychological impact of mCIMT. These studies should investigate different patient demographics, longer follow up times, and multidisciplinary outcome measures including physical, emotional, cognitive and social aspects of rehabilitation.

Future study should further delineate the role of mCIMT as a technique of motor rehabilitation as well as a holistic neuro- rehabilitation strategy supporting both functional recovery and psychological well-being. A deeper knowledge of these inter-related outcomes may enable doctors to develop better patient-centered, effective and holistic rehabilitation programs for individuals living with chronic stroke.

CONCLUSION:

To summarize mCIMT serves as a comprehensive therapeutic approach that address the neurological and psychological needs of the post stroke, hemiplegic patients. It works simultaneously enhancing motor function, emotional well being, self confidence, and participation in daily life. Thus mCIMT empowers the patient to notably progress his independence, confidence, and improved quality of life.

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