Feasibility and Efficacy of Metacognitive Training in Psychosis: A review

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This paper provides a detailed review of empirical studies on Metacognitive Training (MCT) in Psychosis. MCT is regarded as a combination of CBT and cognitive remediation (CRT) and involves many cognitive tasks. This paper included studies that used the MCT modules developed by Moritz S and Woodward T.S. It is delivered as group and individual program. MCT's primary aim is to raise the patients' awareness for both the presence and dysfunctionality of cognitive distortions by means of various exercises and provides corrective experiences. The relationship between cognitive biases and psychosis is continuously stressed throughout the sessions and patients are taught alternative coping and information processing strategies. The studies have carefully examined the feasibility, efficacy and safety of MCT when compared to other interventions or treatment as usual. The studies identified were controlled and uncontrolled studies and few systematic meta-analysis were also reported. The data obtained from these studies suggest that MCT is a feasible intervention subjectively appraised by the participants and has a significant effect in reducing positive symptoms and cognitive biases. In particular MCT had significant effect on reducing distress and conviction related to delusions. It was concluded that MCT is a useful intervention targeting positive symptoms in psychosis.

Keywords: Psychosis; Metacognitive Training; Feasibility; Efficacy.

Schizophrenia is the most disabling illness and is one of the top 15 leading causes of disability worldwide (Lancet, 2017). The course of the illness varies but the onset is generally in early twenties (WHO,1973). Current treatment focuses not only on symptom reduction but also on improving functioning and hence reducing the level of disability. Pharmacological treatment when combined with non-pharmacological treatment methods were found to have more effect. Amongst various non-pharmacological methods Cognitive Behaviour Therapy (CBT) has been studied widely and it was found to be effective in reducing positive symptoms in Schizophrenia. The effect size of CBT was found to be between .49 to .99 (pairwise comparison) and literature suggests that it is an effective adjunct treatment for persons affected with psychosis.(Wykes, Steel, Everitt, & Tarrier, 2008)

Recently a new approach called Metacognitive training (MCT) to treat positive symptoms of schizophrenia especially delusions and hallucinations was developed by Moritz S and Woodward T.S. ("Metacognitive Training for Psychosis - Clinical Neuropsychology Unit," n.d.) Metacognition is the high-level cognitive function that can be defined as any knowledge or cognitive process that refers to, monitors, or controls any aspect of cognition. Patients with schizophrenia experience significant difficulties in the way they think and process information. Recent studies indicate that patients with schizophrenia jump to conclusions, show attribution biases, share a bias against disconformity evidence, are overconfident in errors, and display problems with theory of mind. Cognitive biases, that is, distortions in the collection, appraisal and processing of certain information (e.g. jumping to conclusions (JTC), overconfidence in errors) has been linked to positive schizophrenia symptoms.(Steffen Moritz & Woodward, 2007b) Based on this research,

Moritz and his colleagues have developed this new group treatment program. MCT is viewed as an effective treatment subjectively by patients with psychosis.(Steffen Moritz & Woodward, 2007b) Keeping this in mind this paper aimed to review the available literature on metacognitive training in psychosis.

MCT & CBT

Meta cognitive training is a variant of CBT targeting the cognitive biases in persons with psychosis. MCT uses a different approach in addressing these cognitive biases in comparison with CBT. In CBT the cognitive biases were directly confronted and invites the patient to reality test the content. Whereas MCT uses. real world scenarios to raise awareness about cognitive biases among participants. Instead of directly confronting about their delusions, normalizing cognitive errors through examples that everybody experience in their real life is one of the factor contributing to the wide acceptance of MCT by the participants.(Steffen Moritz & Woodward, 2007b) Through multiple examples and sharing their personal experiences the participants tend to gain insight about their delusions. The main objective of the training is to raise the patient's awareness of these cognitive distortions and to prompt them to critically reflect on, complement and alter their current repertoire of problem-solving skills. This awareness in turn improves their insight about their illness and instil hope in them. MCT and CBT are similar in addressing the cognitive biases but methodologically they differ by using different approaches and strategies.

MCT developed by Moritz and Woodward has eight modules targeting: attributional style (module 1), jumping to conclusions bias (modules 2 and 7), a bias against disconformity evidence (module 3), problems in social cognition (modules 4 and 6), over-confidence in memory errors (module 5) and depressive cognitive patterns (module 8). (Moritz et al, 2010)

Need for the review:

Since the development of MCT there were lot of pilot studies conducted to evaluate the feasibility, safety and efficacy of the intervention. Also there were many systematic reviews done to conclude the efficacy of MCT on patients with schizophrenia. The developers of MCT made several modifications like addition of different domains in the original module. As the last meta-analysis conducted was during 2016, this review aimed at reviewing studies conducted after 2016 and also included all the systematic reviews conducted till 2017 in order to conclude on the feasibility and effectiveness of MCT and also to understand the methodological issues with the studies reviewed.

Method

This review is based on the articles published from 2007 to 2016 on Metacognitive Training developed by Moritz S and his team in various journals. The search strategy adapted was by searching scientific databases i.e., MEDLINE/PUBMED, GOOGLE SCHOLAR with the following terms: "Metacognition", "Metacognitive Training", "Psychosis", "Schizophrenia," "Interventions", "Therapy", "Efficacy" and "Feasibility". Studies conducted on Metacognitive therapy but did not use the module developed by Moritz and Woodward were excluded. All controlled and uncontrolled studies were included.

Result

As represented in Table 1, a total of 23 studies were identified of which there were only two Indian studies. 14 studies were RCT and remaining were uncontrolled studies and case reports. Apart from these studies there were six review articles identified out of which two were systematic meta analytic reviews which is presented in Table 2.

Table 1: Studies from 2007 to 2017 using Metacognitive Training (MCT) Module developed by Moritz S & Woodward TS

Author, Year	Setting	Study design/ Sample Size	Type of intervention	Control Group Intervention	Instruments Used	Main findings
Moritz S et al.,,(2007)	Outpatients	RCT, 20 vs 20	MCT Group	COG PACK	MINI, PANSS, Acceptance and Feasibility was measured by a questionnaire	MCT yielded superior scores relative to COGPACK on several subjective parameters.
Kerstan et al.,,(2009)	Out Patients	Crossover design 18 VS 19 Remitted Schizophrenia Patients	MCT Group	TAU	PSYRATS, QOL, Neuropsychological assessments	MCT Group improved on delusional distress, memory and quality of life when compared to Waitlist group.
Kumar D et al.,(2010)	Inpatients	RCT N=16	MCT Group (Hindi)	TAU	PANSS, Brown assessment of belief scale	MCT Group showed steeper decline in positive symptoms with medium to large effect size.
Aghotor J et al.,(2010)	Inpatients	RCT N=30	MCT Group	TAU	PANSS	The present study confirms the feasibility of MCT and provides preliminary evidence for its efficacy
Favrod J et al., (2010)	Patients attending the Rehabilitation Unit	Uncontrolled Pilot study N=25	MCT Group	N/A	PSYRATS PANSS SUMD	Participants reduced substantially in the severity of their delusions and improved their awareness of delusions. The improvements were accompanied by a reduction in depression.
Moritz S et al.,(2011)	Outpatients	RCT 24 VS 24	MCT group/ MCT + individual	Cog Pack	MINI, PANSS, PSYRATS, Fish task	The results suggest that the combination of a cognition-oriented and a symptom-oriented approach ameliorate psychotic symptoms and cognitive biases and represents a promising complementary treatment for schizophrenia.

Study	Setting	Design	MCT Group	Comparison	Measures	Results
Moritz S et al., (2011)	Inpatients & out Patients	RCT 18vs 18	MCT Group	TAU	MINI.PANSS PSYRATS.FISH TASK. Cognitive Assessments, QOL Post evaluation questionnaire	The present study confirms prior reports that MCT exerts beneficial effects on some cognitive and symptomatic parameters.
Naughton et al, (2012)	In patients	Prospective Naturalistic Cohort Study 11 vs 8	MCT Group	TAU (Waitlisted)	The PANSS, GAF, MacArthur Competence Assessment Tool- Treatment (MacCAT-T)	MCT improved the capacity to consent to treatment as assessed by the MacCAT-T. The GAF score improved in patients who attended the MCT group but there were no changes in PANSS scores.
Balzan et al., (2014)	Outpatients	Not Randomized 14 vs 14	MCT-T (JTC & BADE) Single session	TAU	MINI'PANSS SAPS,PDI-21, WHOQOL, BCIS,SAI, NART, Working memory	Significant decrease in delusional severity and conviction, significantly improved on clinical insight, and cognitive bias tasks. Patients also evaluated the training positively.
Moritz S et al.,(2013)	In and Out patients	RCT N=150	MCT	Cognitive Retraining	MINI,PANSS, PSYRATS, FISH TASK, RSES, Cognitive measures	MCT, led to improvement in delusion symptoms relative to the control condition and over and above the effects of antipsychotic medication. This improvement was sustained at follow-up.
Oosterhout et al., (2014)	Not Mentioned	Multicentered Single blind RCT N=154	MCT + TAU	TAU	PSYRATS (DRS), GPTS, BCIS, DACOBS, MCQ-30	MCT did not affect delusion scores and self-reported cognitive insight, or subjective experience of cognitive biases and metacognitive beliefs. MCT was not cost-effective
Briki M et al., (2014)	In and Out Patients	RCT N=68	MCT Group	ST	PANSS SUMD, PSYRATS,CDSS, QLS	MCT has an effect on reducing positive symptomatology, and a trend impact on insight and social functioning
Moritz S et al.,(2014)	In and Out patients	RCT N=150	MCT Group	Cognitive Retraining	MINI, PANSS, PSYRATS, FISH TASK, RSES, Cognitive measures	Moreover, there were some unanticipated ("sleeper") effects as both self-esteem and quality of life were improved after 3 years.

Study	Setting/Population	Design	MCT Group	Control	Measures	Findings
Kuokkanen et al.,(2014)	Forensic In-Patients with Schizophrenia	RCT N=20	MCT Group	TAU	PANSS, JTC Bias	Metacognitive training showed sufficient promise in this group for a full trial to be worthwhile, and the feasibility of an RCT methodology, even in a secure hospital, was established. The fact that the improvements faded during follow-up suggests that a useful modification to the treatment would be lengthening the protocol, repeating it, or both.
Erawati E et al.,(2014)		Quasi Experimental Approach N-52	MCT +	TAU	PSYRATS Metacognitive Ability Questionnaire (MAQ)	Metacognitive training appears to be effective in decreasing delusion severity and increasing metacognitive ability.
Vizhuthum FB et al., (2014)	Single Case study		MCT group & MCT+	NIL	PANSS & PSYRATS	This case study lends preliminary evidence of combined therapy of MCT group and MCT + by means of significant symptom reduction as measured by PANSS & PSYRATS
Howe et al., (2015)	Inpatient and Out patients	N=164	MCT Group	Nil	A questionnaire to test the usefulness of MCT	The results suggest that MCT is a useful and effective evidence-based psychological intervention. It supports the use of cognitive behavioural interventions in the treatment of individuals experiencing psychosis, although further evaluation is needed.
So.et al., (2015)	Outpatients	Randomized wait list controlled study N=44	MCT Group	TAU	PANSS PSYRATS MADS, Beads Task WAIS III, Subjective satisfaction and effectiveness	There was large treatment effect size in improvement in belief flexibility.
Lam et al., (2015)	Occupational Therapy Unit (Inpatients & Outpatients)	RCT N=80	MCT Group	TAU	BCIS MCT Acceptance and Feasibility questionnaire	Clients randomized into the MCT condition rated the program favourably and showed significant improvements in cognitive insight.

Study	Setting	Design	MCT+COG. REMIDIATION ALONE	COG. REMIDIATION	PANSS COGNITION BADE	Findings
Buonocore M et al., (2015)	Outpatients	RCT N=57			PANSS COGNITION BADE	This study enlightened for the first time the efficacy of MCT+CACR on BADE in schizophrenia, suggesting the importance to develop a more specific intervention tailored on individual needs of patients.
Kumar D et al.,(2015)	case study	Single	MCT +	NIL	PANSS, BABS	Persecutory and referential delusions improved with a course of twelve sessions of therapy. Further, the improvement in delusions had a positive impact on her psychosocial functioning. A follow-up after two months of therapy revealed sustained improvement
Ussorio D et al, (2016)	outpatients	Experimental design N=56 Short DUP vs Long DUP	MCT Young version	Nil	Psychopathology, Cognition, Emotional dysfunction and Social Functioning	Significant and positive changes were found in theory of mind abilities and social perception. The difference in DUP between the two groups of young subjects of our sample did not seem to influence the intervention outcomes, still taking into account that the average difference between the two groups in terms of DUP is 12.6 months.
Ochoa S et al., (2017)	Outpatients	RCT N=126	MCT	Psycho-education group	PANSS,GAF,BCIS, Beads Task, Irrational Belief Test, IPSAQ, Hinting task, Emotion Recognition test	MCT could be an effective psychological intervention for people with recent onset of psychosis in order to improve cognitive insight, JTC, and tolerance to frustration. It seems that MCT could be useful to improve symptoms, ToM, and personalizing bias.

MCT-Metacognitive Training; TAU-Treatment as Usual; RCT-Randomized Controlled Trial; PANSS-Positive and Negative Symptom Scale; GAF-Global Assessment of Functioning; BCIS-Becks Cognitive Insight Scale; PSYRATS-Psychiatric Rating Scale; QOL-Quality of life scale; BABS-Browns Assessment of Belief Scale; NSA-Negative Symptom Assessment.

Table 2: Systematic Review and Meta-Analysis on Metacognitive Training (MCT).

Author, year	Type of the article	Objective	Results
Moritz S et al., (2010)	A review	This review introduces new evidence on cognitive biases involved in the pathogenesis of schizophrenia and demonstrates how the MCT raises the patients' (metacognitive) awareness to detect and defuse such 'cognitive traps.	Recent studies assert marked cognitive biases in schizophrenia. MCT has evolved as a feasible and effective complement of standard psychiatric treatment.
Schneider and Andreou., (2014)	Critical review	The article provides a critical review of metacognitive training (MCT) for psychosis.	MCT represents a promising new direction in intervention research for psychosis that can complement standard treatment approaches.
Moritz S et al.,(2014)	Narrative review	The present article provides a narrative review of empirical studies on metacognitive training in psychosis(MCT).	The preliminary data suggest that the individual MCT format is especially effective in addressing symptoms, cognitive biases and insight.
Jiang et al.,(2015)	Systematic Review	Conduct a meta-analysis to assess the effectiveness of MCT in schizophrenia.	The limited number of RCT trials, the variability of the method and time of the outcome evaluation, and methodological problems in the trials make it impossible to come to a conclusion about the effectiveness of MCT
Eichner and Berna., (2016)	Meta análisis	The present meta-analysis examines the efficacy of MCT in schizophrenia	This meta-analysis demonstrates that MCT exerts a small to moderate effect on delusions and positive symptoms and a large effect on acceptance of the intervention.

The authors, Moritz S and Woodward T.S summarized the evidences on cognitive biases which contribute to the maintenance of positive symptoms in patients with psychosis. They stated that patients with psychosis jump to conclusions, show attributional biases, share a bias against disconformity evidence, are overconfident in errors, and display problems with theory of mind. Based on these findings they developed the Metacognitive training program which aimed at bringing awareness about the cognitive biases by providing scientific knowledge about the biases and corrective experiences in an engaging and supportive manner.

Several studies have been conducted since the introduction of MCT and the results were discussed based on the three main topics Effect of MCT on Positive Symptoms, Insight and Social Functioning. These topics were chosen to be discussed based on the primary and secondary outcome which has been the focus in the articles reviewed. The primary outcomes were psychopathology ie impact of MCT on positive symptoms and cognitive biases. The secondary outcomes focused were Insight and social functioning. The feasibility, effectiveness and safety of the approach were also discussed as they were the important areas to be explored to understand the effectiveness of any intervention.

The latest meta-analysis showed significant small to moderate effect of MCT on positive symptoms and delusions in particular. Also it was reported that differences in methodological rigour were responsible for some but not all of the effects (Eichner & Berna, 2016). A study done at an Indian setting with the hindi translated module on MCT by Kumar et al showed highest effect size with regard to positive symptoms.(Kumar et al., 2013) A study done by Erawati, 2014 favored

MCT with regard to delusions had an effect size of 1.72.(Erawati, Keliat, Helena, & Hamid, 2014)

On the other hand, effect size with regard to acceptance of MCT, by Briki showed very small effect size when compared to other studies.(Briki et al., 2014) This might be because this study used a different tool and remaining studies used a tool with 10 questions uniformly.

Feasibility of MCT:

The original authors after developing the MCT modules examined the feasibility of the same by means of a pilot study. Forty outpatients with a diagnosis of schizophrenia spectrum disorders were randomized to two treatment arms: MCT and CogPack Training. Acceptance and feasibility was determined by measuring the frequency of unattended sessions per patients and feedback of a questionnaire that has to be filled at the end of each module. The results obtained asserts the feasibility of MCT. MCT was significantly rated higher than the control intervention.(Steffen Moritz & Woodward, 2007a)

Following this Aghotor et al in 2010 recruited 30 inpatients with a diagnosis of Schizophrenia and on randomization allocated to MCT program or to an active control intervention. Participants were assessed at baseline and at end of the intervention on their psychopathology, cognitive and metacognitive biases and also a subjective appraisal about the two interventions were obtained. A weak to medium effect size was found with regard to reduced jumping to conclusion bias and positive symptoms in the MCT group when compared to the active control condition. This study also emphasised on the feasibility of MCT based on the subjective appraisal which had medium effect size when compared to the control intervention. This study is underpowered which was quoted as an limitation.(Aghotor, Pfueller, Moritz, Weisbrod, & Roesch-Ely, 2010)

Most of the studies used the 10 item questionnaire which was initially used by Moritz et al in 2007 to assess the subjective appraisal about MCT (Moritz S and Woodward T.S, 2007a). All the studies showed that MCT is well received by patients and it is feasible. Participants considered the modules under MCT

to be fun and felt it is beneficial and hence they recommend it to other patients. Even though the subjective feeling of fun, enjoyment and usefulness of the intervention are secondary outcomes they act as an intrinsic motivating factor for an individual which in turn would definitely contribute to treatment adherence.

Efficacy of MCT:

The effectiveness of MCT was studied using controlled and uncontrolled trials yielding predominantly positive results. MCT mainly targets delusions and positive symptoms in psychosis as their primary outcomes as the MCT targets cognitive biases. Only few studies have assessed insight and social functioning as outcomes with relation to MCT.

Effect of MCT on Symptoms:

Various studies, both randomized and non-randomized, have examined the efficacy of MCT on psychopathology in schizophrenia. Overall, there is a significant improvement in positive symptoms with MCT although the effect size varied between the studies. Severity of Delusions showed a considerable reduction and the participants awareness about their delusions improved in particular. But in few studies, no statistically significant difference was observed between the control and MCT group with respect to positive symptoms. MCT had no effect with regard to hallucinations. In case of negative symptoms, no significant difference is observed with MCT. Similarly, MCT does not show a significant effect on general psychopathology. These results indicate that MCT could be specific for positive symptoms in schizophrenia with no or limited efficacy for negative and general psychopathology symptoms in schizophrenia. (Kumar et al., 2010; S. Moritz et al., 2011; Steffen Moritz et al., 2013)

Effect of MCT on Cognitive biases:

Many studies that examined the impact of MCT on cognitive bias have predominantly looked at jumping to conclusion (JTC) and few studies on over confidence in errors. Mixed results are observed on the impact of MCT on cognitive biases. While few studies show a significant difference in improvement in the cognitive biases in the group treated with MCT

when compared with the control group, few other studies did not find any statistically significant difference between the groups. No conclusion could be drawn from these studies on the efficacy of MCT on cognitive biases and further studies are needed in this regard.(Kuokkanen, Lappalainen, Repo-Tiihonen, & Tiihonen, 2014; S. Moritz et al., 2011; Steffen Moritz et al., 2013; So et al., 2015)

Effect of MCT on Cognition:

While significant improvement with large effect size were observed for certain aspects of cognition with MCT such as attention and delayed memory, medium and small effect size were found for recent memory and visuospatial working memory, respectively.(Kumar et al., 2013; S. Moritz et al., 2011)

Effect of MCT on insight and functioning:

Overall, MCT has a positive impact on the general functioning in individuals with schizophrenia. There is a significant improvement in the general functioning with MCT. In one study which involved chronic individuals with schizophrenia, no significant difference was observed. These results indicate that MCT could have a positive improvement in general functioning in acute but not chronic condition. Two studies used SUMD to assess Insight. One study revealed a trend of improvement with regard to insight and another indicated that MCT group showed significant improvement in their awareness about their symptoms. Four studies used Becks Cognitive Insight Scale (BCIS) to measure the Cognitive Insight and the results were contradictory. MCT also has shown to be associated with improvement in quality of life, self -esteem and depressive symptoms.(Briki et al., 2014; Favrod, Maire, Bardy, Pernier, & Bonsack, 2011; Naughton et al., 2012; Ochoa et al., 2017).

Discussion

The review articles reports MCT to be a feasible adjunct treatment for persons with psychosis. The systematic meta-analysis stated that MCT exerts a small to moderate effect size on positive symptoms in psychosis. (Eichner & Berna, 2016) The findings reported by various controlled and uncontrolled trials were inconclusive which might be due to the small sample size. Majority of the studies reported that MCT was effective in reducing delusions and distress related to it and did not show any effect on hallucinations. Hence including a specific module on hallucinations might be an option to address this issue. There are no adequate studies about the maintenance effect of MCT. Majority of the studies spoke about the feasibility and acceptance of the intervention among participants and the results were promising. Participants seemed to accept MCT might be because of its non-confrontational approach. The module being translated in various languages, as of now it's available only in one Indian language Hindi. Except for two studies using the Hindi module there are no other studies available. Among the eight modules of MCT there are specific modules that targets depressive symptoms, self-esteem and stigma. The author of this paper is in the process of studying the effectiveness of these specific modules among patients with schizophrenia as part of her PhD. The modules are translated to the Tamil language and its efficacy will be studied using a RCT design.

Methodological issues

Out of the 23 studies, 14 studies were randomized control trials but majority of them failed to explain how randomization was done. In most of the studies, assessments were conducted by psychologists who were blinded about the allocation. The sample size predominantly ranged from 20 to 40, only 3 studies had sample size more than 100. Also these studies have used a wide range of assessments as primary and secondary outcome measures. The primary target of MCT are psychopathology and cognitive biases, but the studies have used other measures like neurocognitive assessments, cognitive insight which might not be the core target of MCT. There were many studies that did not explain about drop out clearly and also they have not adapted intent to treat analysis. Only few studies have assessed patients at 3 months or 6 months after the intervention. According to the developers of MCT, psychiatrists, psychologists and psychiatric nurses can deliver the intervention by reading the manual. But the studies did not explicitly

explain about the training of the professionals. A few studies have mentioned experienced psychologist who have been trained in delivering MCT delivered the modules to patients but did not give more details about how or by whom they were trained.

There were only two Indian studies with MCT; one was a case report and the other one was a RCT with 16 inpatients. The RCT study did not report about the randomization process, and there were no follow up assessments conducted. Also, the study was done among inpatients and it cannot be generalised to other setting. Patients were expected to come twice in a week for a one hour session and the content of the powerpoints used in each module are very extensive. After understanding about the extensive content of the modules, the time taken to deliver each session it shows a seed of doubt about the feasibility of such an intervention in a developing country.

Conclusion and Future direction

With the given evidences, it has been understood that MCT is a promising intervention targeting positive symptoms, delusion in particular among patients with schizophrenia. The feasibility and effectiveness has been demonstrated by number of studies in the west and there are only few studies from LAMI countries. The MCT modules have been translated to 33 languages including one Indian language, Hindi. As it represents a promising direction complementing antipsychotic treatment there is a strong need that efficacy and feasibility of MCT has to be studied extensively in LAMI countries.

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