

Review Article

Cognitive-Behavioural Therapies and Motivational Interviewing for Methamphetamine Use Disorders: A Systematic Review

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Abstract

Objective: Methamphetamine use disorders are a matter of public health. The goal of this study was to conduct a systematic review of clinical trials concerning cognitive-behavioural therapies (CBTs) and motivational interviewing (MI) for methamphetamine use disorders.

Method: We have conducted a systematic review of the literature on MEDLINE in order to include all controlled clinical trials that were published up to March 31st, 2017.

Results: Of the 369 articles that were reviewed, six clinical trials (n=1578) fulfilled our inclusion criteria. Concerning CBTs, one clinical trial (n=978) found results in favour of the Matrix Model versus treatment-as-usual (but the results were not consistent over a six-month period), two clinical trials (n=231) found a significant increase of abstinence when the Matrix Model (p<0.05) was supplemented with contingency management (CM), and one clinical trial (n=104) found no significant difference between acceptance and commitment therapy (ACT) and classical CBT. Concerning motivational interviewing, one clinical trial (n=48) — consisting of two motivational interviewing sessions — found a significant decrease in the number of days of drug use compared to psychoeducation (p<0.04), and one trial (n=217) found there was no significant difference between nine sessions and a single session of MI supplemented with CBT group sessions.

Conclusions: Few clinical trials have been carried out regarding cognitive-behavioural therapies and motivational interviewing for methamphetamine use disorders. Cognitive-behavioural therapy trials have higher statistical power than motivational interviewing trials. New clinical trials should be carried out.

INTRODUCTION

Methamphetamine is the world's most popular psychostimulant drug [1]. In the United States, the incidence of methamphetamine use disorders is increasing rapidly: in California, the number of medical consultations linked to methamphetamine use disorders have increased thirteen-fold between 1983 and 2008 [2]. In 2004, 2.90% of the population over twelve years of age had experimented with methamphetamine at least once in their life. Methamphetamine use disorders are associated with very high morbidity: acute coronary syndromes [3], arrhythmias [4], psychotic symptoms [5,6] and suicide attempts [7,8] are frequent. High-risk sexual behaviours increase the risk of HIV infection [9,10]. Though methamphetamine is molecularly similar to amphetamine, the former produces a longer and more intense state of arousal [11]. Contrary to amphetamine, methamphetamine may be smoked in its hydrochloride form, which hastens the onset and augments the intensity of its effects. Methamphetamine differs from cocaine

because of its molecular structure, its lower cost — which makes it more accessible — and its interference with the vesicular monoamine transporter 2 (VMAT-2) [10].

Numerous pharmaceutical treatments (sertraline [12], bupropion [13,14], mirtazapine [15,16], modafinil [15,17], dextroamphetamine, ondansetron [18], risperidone, aripiprazole [19], baclofen [20], gabapentine [20], topiramate [21], naltrexone [22]) have been evaluated for methamphetamine use disorders without showing consistent effectiveness which further justifies continuing psychotherapeutic clinical trials. Many types of CBT have already been evaluated (the Matrix Model, CM, ACT) as well as motivational interventions of varying intensities.

The Matrix Model is an intensive, multicomponent outpatient treatment. It takes place over a period of sixteen weeks and is composed of 36 cognitive-behavioural therapy group sessions, twelve family education group sessions, four social support group sessions and four individual drug counselling

sessions, as well as urine tests and weekly breath alcohol tests. Reinforcement delivered by peers and therapists is widely used. Contingency management is a type of behavioural therapy which aims to reinforce positive behaviours (in this case, negative urine tests as evidence of abstinence) through the use of vouchers which generally increase in value when a patient is able to produce many consecutive negative test results. Acceptance and commitment therapy (considered to be a third wave CBT) revolves around six core processes: acceptance (improving cognitive process observation and reducing avoidance of these processes), cognitive defusion (understanding that thoughts are psychological events that are not necessarily a reliable reflection of reality), self as context (embracing a more flexible position), contact with the present moment (heightening one's level of consciousness in the here and now), values (knowing what is of importance in one's life), and committed action (taking action in accordance with one's values) [23]. Motivational interviewing aims to help a patient decide to change behaviour and to help make the intended objective a reality. It does this by helping the patient explore his/her own ambivalence and dilemmas, and by reinforcing his/her sense of freedom, responsibility, and personal efficiency. In our systematic review, motivational interviewing presents itself in varying degrees of intensity (one single 90-minute session, two 20-minute sessions, or nine weekly sessions).

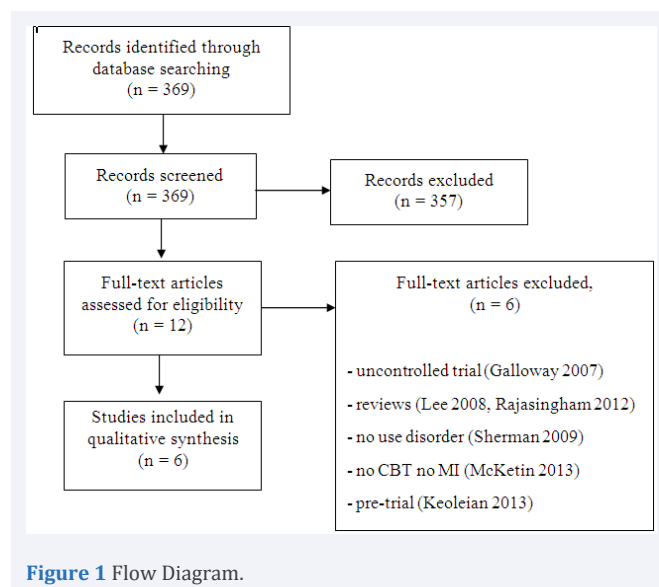
Two systematic reviews of the literature concerning CBT for methamphetamine use disorders have already been undertaken [24,25]. However, more recent publications on the subject have presented new results. Moreover, the second of the abovementioned reviews only looked at clinical trials of HIV positive homosexual males. The goal of this study is to conduct a systematic review of controlled clinical trials pertaining to cognitive-behavioural therapies and motivational interviewing for people with a methamphetamine use disorder, while excluding pharmacotherapy as well as trials in which participants are selected based on sexual orientation.

METHODS

In March 2017, we consulted three databases: Medline, Cochrane Library, and clinicaltrials.gov.

On Medline (www.ncbi.nlm.nih.gov/pubmed), we activated the filter "humans" and we searched articles related to cognitive-behavioural therapies and motivational interviewing for methamphetamine use disorders using a single query term, in order to avoid duplicates: "therapy [Title] AND methamphetamine [Title] OR therapies [Title] AND methamphetamine [Title] OR cognitive [Title] AND methamphetamine [Title] OR behaviour [Title] AND methamphetamine [Title] OR behavioural [Title] AND methamphetamine [Title] OR motivational [Title] AND methamphetamine [Title] OR intervention [Title] AND methamphetamine [Title] OR task [Title] AND methamphetamine [Title] OR treatment [Title] AND methamphetamine [Title]".

369 results were obtained. We included articles (published in either French or English) on controlled clinical trials of cognitive-behavioural therapies and motivational interviewing for people with a methamphetamine use disorder. We excluded editorials, literature reviews, in vitro trials, animal trials,



uncontrolled clinical trials, pharmacological trials (combined [or not] with a CBT or motivational intervention), trials in which participants were selected based on gender or sexual orientation, trials of therapies other than CBT or MI, trials with participants with no methamphetamine use disorder and trials targeting multiple substances (Figure 1). Articles published in languages other than French or English were also excluded. In the Cochrane Library (www.thecochranelibrary.com), we searched articles whose title, summary, or keywords included "methamphetamine". We obtained three hits. None of them concerned CBTs or MI. On clinicaltrials.gov, we searched for the keyword "methamphetamine" among completed studies with results, obtaining 46 results, only one of which corresponded to our search and referred to an article that we had already obtained on Medline.

RESULTS

Following our research, six randomized controlled trials of 1578 subjects with a methamphetamine use disorder who had been followed up over periods of eight to twelve months fulfilled both our inclusion and exclusion criteria. Various therapies were evaluated: The Matrix Model, contingency management, acceptance and commitment therapy, as well as motivational interventions of varying degrees of intensity.

Cognitive-behavioural therapies

The Matrix Model brought an improvement in a single-blind, multicentre, randomized controlled clinical trial [26] of 978 subjects, all of which were methamphetamine-dependent and unpaid. The total duration of the treatment was sixteen weeks. The participants of the Matrix Model group showed a significant increase in assiduity, the number of negative urine tests, and the duration of abstinence when compared to the group receiving the treatment-as-usual. However, this increase did not remain stable at the follow-up six months later. The treatment-as-usual, which was different for each of the eight centres, was of "best possible option" type (as opposed to "minimal intervention") and comprised an intensive four to sixteen-week therapy phase

(depending on the site) so that each participant had one to thirteen hours of therapy per week. Breath alcohol tests and urine toxicology tests were performed weekly.

Contingency management resulted in improved retention and abstinence in a randomized controlled clinical trial [27], of 118 methamphetamine-dependent patients (55% male) aged 18 to 65 and split into four groups. The total duration of the treatment was 16 weeks. Each group received the standard three-times-per-week psychosocial treatment based on the Matrix Model [28]. Contingency management was used with three groups for varying lengths of time (un, two or four months) depending on the group; contingency management was not used with the control group. The results were in favour of contingency management: at sixteen months of treatment, retention was significantly higher ($p < 0.05$) within the three groups that had benefited from the contingency management approach in comparison with the control group. Moreover, at the one-year follow-up, retention remained higher for the group that had benefited from the contingency management approach for a duration of four weeks in comparison with the control group ($p < 0.008$). The average length of abstinence and the percentage of patients that were totally abstinent were significantly higher ($p < 0.05$) within the groups that had benefited from the contingency management strategy in comparison with the control group. Reinforcement magnitude was varied (50% of the chips read "good job", 41.8% of the chips were worth around \$1, 8% were worth about \$20, 0.20% were worth about \$80), and the number of vouchers per negative urine test increased by one for each consecutive week of abstinence. Apart from reinforcement contingencies, participants received no salary. Urine tests were performed thrice weekly throughout the entire duration of the study.

These results confirm those obtained by a different randomized controlled trial (performed by the same authors [29]) of 113 subjects who are consumers of or dependent on methamphetamine and who benefited from the treatment-as-usual with or without a supplementary twelve weeks of contingency management. At the 24-week follow-up, there were considerably more negative tests for methamphetamine, cocaine, amphetamine and alcohol within the contingency management group compared to the control group ($p = 0.01$) and the contingency management participants had a considerably longer period of abstinence ($p = 0.02$), as attested by urine tests. Reinforcement magnitude was varied and participants were not given any payment apart from reinforcement contingencies. However, the treatment-as-usual was not standardized: though most participants followed the Matrix Model therapy, a minority were instead given both cognitive-behavioural therapy and relapse prevention.

Acceptance and commitment therapy did not bring a significant improvement in comparison with CBT at the 24-week follow-up after twelve weeks of treatment in a randomized controlled clinical trial [23]. The study gathered 104 subjects (60% male) who abuse methamphetamine or are dependent on it, and who were being treated with neither antipsychotics nor antidepressants or mood stabilizers. The included subjects were given AUD\$20 for each completed evaluation session (maximum of three). Each week they were given 12 one-hour sessions of

either CBT or ACT. The subjects were mostly unemployed (39%) and used drug by injection (78%). The retention rate was of 29.8%.

Motivational interviewing

Two 20-minute motivational interviewing sessions helped decrease consumption in comparison with one fifteen-minute psychoeducation session in an eight week, randomized controlled trial [30], of 48 teenagers aged 14 to 19, all of whom either smoked or abused methamphetamine or were dependent on it. In order to take part in the abovementioned sessions, the participants had to produce a negative urine drug test for methamphetamine and score below ten on the Amphetamine Withdrawal Questionnaire (AWQ). The participants were paid \$1.15 for each visit. The number of days of methamphetamine consumption per week decreased significantly in both groups ($p < 0.001$) and significantly more in the motivational interviewing groups ($p < 0.04$), while the number of pills consumed on consumption days decreased considerably in both group ($p < 0.001$), without any significant difference between the two groups.

Nine weekly motivational interviewing sessions did not reveal any difference with one single motivational interviewing session in a randomized controlled trial [31], of 217 methamphetamine-dependent subjects (51% male) who possibly presented a psychiatric comorbidity. Moreover, each subject benefited thrice weekly from CBT group sessions that focussed on dealing with cravings. The subjects who benefited from one single motivational interviewing session were also given eight nutritional education sessions so that the duration of the therapy would be the same for them as it was with the other participants. The subjects were evaluated at the beginning and at two, four and six months and received \$50 each time. The retention rate of the included subjects was 87%, but the attrition rate was 55% between the screening and the first evaluation. Methamphetamine use decreased in both groups ($p = 0.04$) without any significant difference between the two groups. The motivational interviewing sessions that were used had been adapted from Miller's works within the Project MATCH [32,33] and from those of Obert and Farentinos. The therapy's principal characteristics were the writing of clear and specific objectives, resorting to open-ended questions, rolling with resistance, empathy, highlighting contradictions and reflective listening. The first session concerned problem identification; the second concerned ambivalence, whereas the third dealt with the establishment of a change plan and the identification of potential obstacles. With subjects in the pre-contemplation stage, the therapist explored the potential for small changes. Sessions four to eight were called boosters: they consisted of a review of the preceding weeks' progression, all the while remaining focussed on the subject's ambivalence and the progress that had been made with regards to the change plan. The ninth session was the concluding session, during which a review of the achieved progress was made and prolonged treatment options were looked at, if the patient wished to continue being treated.

DISCUSSION

Our research resulted in six randomized controlled clinical trials (1578 subjects) that together form an original, systematic

review of the literature regarding controlled clinical trials of cognitive-behavioural therapies and motivational interviewing for subjects with a methamphetamine use disorder, while excluding trials in which participants were selected based on sexual orientation (contrary to Rajasingham et al. [25]), trials with participants with no methamphetamine use disorder, trials recruiting subjects who consume substances other than methamphetamine (contrary to Lee et al. [24]), as well as trials that also evaluate pharmacotherapy in comparison to or in combination with psychotherapy (contrary to Lee et al. [24]). This literature review has highlighted the effectiveness of CBT and motivational interviewing patient care, the results of which are however variable.

Contingency management seems to bring the most significant results. Certain aspects of the study methodology of Roll et al. [29], were problematic: the origin of the participants between the four centres was very unbalanced, the treatment-as-usual could vary from one subject to another, and many variants had been added to contingency management (systematic prize distribution at the end of a week of abstinence, token distribution for substances [opiates and cannabis] that were not evaluated in the study). These aspects were corrected in the 2013 [27] trial which reinforced the positive results of the 2006 trial [31]. The two clinical trials carried out by Roll et al. [27,29], lead to the thought that contingency management, as an add-on to the Matrix Model, represents a therapeutic gain. The one-year follow-up and the six-month follow-up of these two trials give cause for hope that their transferability to clinical practice is good. The Smout et al. [23], clinical trial seems to indicate that ACT and CBT, when compared to classical CBT, do not present any significant difference in terms of therapeutic effects for methamphetamine use disorders. The study methodology here is strong and does not call for any major critiques.

The Rawson et al. [26], clinical trial project is an ambitious one (almost 1000 patients, 56 sessions spread over sixteen-weeks or 3.5 weekly sessions) and does not offer any convincing arguments in favour of the Matrix Model in relation to the treatment-as-usual. It also presents considerable methodological problems: the treatment-as-usual varies between the clinical centres, leading to complex analyses, many nonsignificant results, and an absence of data concerning the one-year follow-up, which suggests a publication bias by omission.

Overall, the Srisurapanont et al. [29], trial is in favour of the therapeutic effect of brief interventions that use either motivational interviewing or psychoeducation, without either approach appearing superior to the other, at least in the short term (the duration of the trial was of eight weeks). The intention-to-treat analysis concerns only a portion of the included participants (36 out of 48) without this being clearly justified by the authors.

The Polcin et al. [31], trial supports the therapeutic effect of motivational interviewing, be it one single session or nine weekly sessions. However, it is important to mention that motivational interviewing was used as an add-on therapy for subjects already benefiting from relatively intensive CBT group therapy (three sessions per week for a period of twelve weeks) and that no urine tests had been administered.

Despite the use of criteria in an effort of coherence, the six selected articles do not form a homogenous set (diversity of interventions, different follow-up durations and one article concerning a teenage population).

CONCLUSION

This literature review differs from previous reviews of the same subject in the originality of its methodology and shows the positive contribution of cognitive-behavioural therapies and motivational interventions in methamphetamine use disorders. The strongest data obtained is possibly the therapeutic gain represented by the adjunction of contingency management to the Matrix Model. Further research on the subject could examine whether or not this therapeutic gain exists when contingency management is used in conjunction with other therapies. The cost-effectiveness of contingency management as an add-on could also be further explored. In regard to motivational interviewing as an add-on to CBT group sessions, increasing the number of sessions does not seem to be relevant. Acceptance and commitment therapy did not show any significant difference in comparison to classical cognitive-behavioural therapy. Other psychotherapies should benefit from studies with a stronger methodology base. In the case of methamphetamine use disorders — to which pharmacotherapy has not brought satisfaction — the question arises as to whether the results obtained in the trials presented in this review can be transposed into real practice, in keeping with a holistic and individual approach to the patient adapted to the social and sanitary services available.

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