

Effect of Abstinence on Depression, Anxiety, and Quality of Life in Chronic Methamphetamine Users in a Therapeutic Community

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Background: During withdrawal, patients experience different symptoms. These symptoms are associated with relapse. Understanding different outcomes of methamphetamine abstinence is useful for finding better treatments for dependence.

Objectives: This study aimed to show the effects of abstinence on depression, anxiety, and quality of life in methamphetamine users.

Patients and Methods: A prospective quasi-experimental (before and after study) method was used to show the effect of 3 weeks abstinence on depression, anxiety, and quality of life. A convenient sample of addicted people entered into the study and 34 people completed the study. Beck Depression Scale, Cattell Anxiety Inventory and Short Form Health Survey (SF-36) (for assessing quality of life), were used for outcome assessments.

Results: The mean depression score after abstinence decreased significantly ($P < 0.001$). Both hidden and obvious anxiety and total anxiety had a high level at admission and after 3 weeks of abstinence, the mean level of anxiety did not change significantly ($P < 0.096$). However, the quality of life increased after 3 weeks of abstinence ($P < 0.001$).

Conclusions: Depression and anxiety are prevalent in methamphetamine users. Short-term abstinence improves depression and quality of life but does not improve anxiety in methamphetamine abusers. During follow up of these patients, addressing depression and anxiety is important to achieve better results.

Keywords: Amphetamine-Related Disorders; Substance Withdrawal Syndrome; Methamphetamine; Depression; Anxiety; Quality of Life

1. Background

Amphetamines are a group of illicit drugs with stimulant effects. They are synthetic sympathomimetic amines with severe effects on central nervous system (1). Methamphetamine is a highly addictive drug that its abuse has become more widespread over the past years (2, 3).

It is estimated that 0.3% to 1.3% of world population misuse amphetamine groups. This figure is also higher in Middle East (1). Although substance use disorders are not the leading causes of death, they have an important share in disability burden worldwide (4). In 2010, about 0.8% of world disability-adjusted life years (DALY) (20.0 million DALYs) was directly related to illicit drug dependence (5).

Amphetamine use has different health consequences, including risk of dependence, acute toxic effects (like fatal overdose, drug induced psychotic symptoms, and myocardial infarction), health effects of sustained chronic use (like psychotic disorders and common mental disorders), and accompanying problems like cardiovascular pathology and neurotoxic effects (1, 2, 6-9).

Methamphetamine is a lipophilic substance, which easily passes the blood brain barrier and has important

effects on neurochemical systems (10). In CNS, methamphetamine enters neuronal cell membranes by binding dopamine, norepinephrine, and serotonin transporters and causes monoamines to leave vesicles and accumulate in cytoplasm and then be transported out of the cell (11, 12). This result in the release of monoamines, which in accompany with decrease in its reuptake (13) causes monoamines concentration in the extracellular spaces and excessive stimulation of the sympathetic system. The clinical effects of methamphetamine is related to prolonged release of central monoamines, which leads to sympathetic system stimulation (11).

In chronic users, the sustained and repeated release of central monoamines has a great role in chronic neurologic effects of methamphetamine abuse. Frequent use leads to depletion of the dopamine in CNS and damages dopamine and serotonin terminals. Damage to monoaminergic neurotransmission (serotonin, norepinephrine, and dopamine) has important effects on brain circuits and mood regulation and also the function of self-control, motivation, cognitive performance, and psycho-

logical stress (14). These changes make the user unable to take pleasure without the drugs (anhedonia), which can easily lead to severe depression (15).

During abstinence and withdrawal, patients experience different symptoms. These symptoms are linked to relapse of drug abuse. Anxiety and depression are of the most prominent psychiatric complaints of methamphetamine users, which must be considered in the treatment of methamphetamine users (16, 17). After abstinence, some patient's symptoms resolve or decrease during the first few weeks (18) but some remains that may extend beyond a year or more (19).

Although behavioral counseling is the standard treatment for methamphetamine dependence (7, 20, 21), pharmacologic and structural interventions seem to be helpful as additional therapies (20). Understanding different outcomes of methamphetamine abstinence is useful for finding better treatments for dependence. Some studies have shown the change in depression symptoms during abstinence but few studies worked on anxiety and quality of life during this period.

2. Objectives

This study aimed to show the effects of abstinence on depression, anxiety, and quality of life in methamphetamine users.

3. Patients and Methods

The study was a prospective quasi-experimental (before-after) research. The study took place in a therapeutic community named Verdij. It is a residential rehabilitation center for methamphetamine users. Patients who only have methamphetamine addiction (at the time admission) are eligible for admission in this center. The usual program of a patient in this camp lasts 5 periods of 21 days. In the first 3 weeks, patients are in a drug free environment (abstinence), and have the peer group (people who passed this way previously) support and after the first week, they may receive some minor behavioral interventions. During the second 3-week period, psychotherapy interventions begin for the patients. Patients stay for 6 weeks but there is not any obligation to stay and they can leave the camp in any stage of the program.

A sample of 40 methamphetamine addicted people (they were using only methamphetamine at the time of study and none of them was using narcotics or other drugs) who admitted in the therapeutic community (Verdij camp) for rehabilitation, were selected by the convenient method. Of them, 6 people did not complete the

abstinence period and left the camp during the study period and 34 participants completed the study.

The intervention comprised 3 weeks of abstinence (first three weeks of peoples' stay), which was the usual camp program, including staying at the camp without accessing to methamphetamines and with the least supportive and behavioral interventions. No psychological program, group therapy, or pharmacotherapy took place in the first 3-week period.

Outcomes of interest were change in depression, anxiety, and quality of life. Short form of Beck depression scale (22-25), Cattell anxiety inventory (26), and Short Form Health Survey (SF-36) (27) were used for outcome assessments.

Short form of Beck has 13 questions and validity and reliability of its Persian version was used in different studies and had validity and reliability with Cronbach α of 0.83 to 0.85 (28, 29). Cattell anxiety inventory has 40 questions, which has two parts for hidden and obvious anxiety. Assessment gives a score of 0 to 40 in each section (total score of 0 to 80) and higher scores show more anxiety. The validity of its Persian version has been determined and reliability has been reported from 0.65 to 0.85 (30). Short Form Health Survey (SF-36) has 36 items and 8 subscales and the reliability (Cronbach α from 0.77 to 0.90 in subscales) and validity of its Persian version has been confirmed (31).

Assessments were performed once before admission and again, after 21-day stay in camp. Results were described by mean \pm standard deviation at 95% confidence interval. Paired t test was used to compare outcomes before and after abstinence.

4. Results

All subjects were male, 61.8% ($n = 21$) aged 20 to 30 years and the rest ($n = 13$) over 30 years. Of them, 52.9% ($n = 18$) were single, 29.4% ($n = 10$) were married, 5.2% got divorced and 11.8% were in a state of separation. Most of them (70.6%) had high school education and 29.4% had an academic degree.

The mean depression score before admission was 17.11 ± 9.75 and after 3 weeks of abstinence it declined to 9.96 ± 7.16 . Depression scores after the abstinence decreased and the difference was statistically significant ($P < 0.001$). The results are shown in Table 1.

Mean scores of hidden, obvious, and total anxiety are shown in Table 2. Mean scores of anxiety was 76.00 ± 2.99 at admission and 36.79 ± 4.08 after 3 weeks. Hidden, obvious, and total anxiety scores decreased after 3 weeks of abstinence, but none of the changes was significant.

Table 1. Depression Score Before and 3 Weeks After Methamphetamine Abstinence ^{a,b}

Outcome	Before Admission	After 3 Weeks	Mean Difference	P Value
Depression Score	17.11 \pm 9.75	9.96 \pm 7.16	6.77	0.001

^a Data are presented as Mean \pm SD.

^b P value < 0.05 considered as significant.

Table 2. Anxiety Score Before and 3 Weeks After Methamphetamine Abstinence ^{a,b}

Outcome	Before Admission	After 3 Weeks	Mean Difference	P Value
Hidden Anxiety	37.82 ± 2.30	36.79 ± 4.08	0.82	0.420
Obvious Anxiety	37.53 ± 3.89	36.32 ± 7.10	1.26	0.217
Total Anxiety Score	76.00 ± 2.99	73.12 ± 9.19	2.88	0.096

^a Data are presented as Mean ± SD.

^b P value < 0.05 considered as significant.

Table 3. Quality of Life and Its Scales Before and 3 Weeks After Methamphetamine Abstinence ^{a,b}

Outcome	Before Admission	After 3 Weeks	Mean Difference	P Value
Physical functioning	23.24 ± 5.39	25.94 ± 3.91	2.71	0.014
Role limitations (physical problems)	5.65 ± 1.47	6.00 ± 1.41	0.35	0.195
Bodily pain	4.62 ± 2.13	4.53 ± 2.31	-0.09	0.815
General health	11.12 ± 2.23	10.50 ± 2.16	-0.62	0.182
Vitality	12.97 ± 3.52	13.44 ± 2.46	0.47	0.386
Social functioning	5.29 ± 1.31	5.91 ± 1.06	0.62	0.051
Role limitations (emotional problems)	4.24 ± 1.13	4.76 ± 1.32	0.52	0.032
Mental health	17.26 ± 3.41	18.50 ± 3.16	1.24	0.029
Total score	84.38 ± 10.79	89.59 ± 8.55	5.21	0.001

^a Data are presented as Mean ± SD.

^b P value < 0.05 considered as significant.

The mean score of quality of life at admission was 84.38 ± 10.79. After 3 weeks of abstinence the mean score was 89.59 ± 8.55. The quality of life increased after 3 weeks of abstinence and the difference was significant ($P < 0.001$). Table 3 shows mean scores for quality of life and its scales before admission and 3 weeks after. "Quality of life" score changes after 3 weeks were significant with respect to physical functioning, role limitations (emotional problems) and mental health subscales.

5. Discussion

The study findings showed that withdrawal in short term decreased depression level but the anxiety did not change significantly. Withdrawal improved quality of life, which could also be seen in some of its scales. A cross sectional study by McGregor et al. (32) showed that methamphetamine withdrawal syndrome can be categorized into two phases of first 7 - 10 days of acute phase and a second sub-acute phase, which is at least 2 weeks. In acute phase, increased sleeping and eating, depression, anxiety symptoms, and also craving exist but following the acute phase, these symptoms remain at a low level (32).

The study group had a high level of depression at admission. A study showed that substantial percentages (40%) of methamphetamine users, who enter into treatment process, have major depression and another 44% may have substance-induced depression (33). Depression level of methamphetamine users decreased significantly after withdrawal, which is compatible with other studies (18,

19, 34, 35). Newton et al. also showed that some degrees of depression exist during the first days of abstinence, which after that time, it reaches to minimal levels (36).

Our study showed that patients entering to the treatment program have a high level of anxiety, including both hidden and obvious, which does not improve in 3 weeks of abstinence. Mancino et al. (35) in a pilot study with 6 patients stated that anxiety symptoms would improve during the first few weeks. Small sample size of study and possible use of psychotropic medications in their study may have an effect on the results. Also the change in anxiety may have been the result of staying at a supportive group or engaging in study and a Hawthorne effect.

It has been shown that after methamphetamine use, it enters neuronal cell membranes and causes monoamines release, including serotonin, norepinephrine, and dopamine (11-13) and excessive stimulation of the sympathetic system by this release and also preventing its reuptake. In chronic use of methamphetamines, depletion of monoamines damages the monoaminergic neurotransmission, including serotonin, norepinephrine, and dopamine. This plays a role on mood regulation and with other changes (14) can cause anhedonia in a chronic user and move them to depression (15).

Although after abstinence, there are some improvements in depression scores, it is not clear that how much the damaged neurotransmission is repaired or how this improvement happens. A study on brain glucose metabo-

lism in methamphetamine chronic users showed abnormalities in the same parts of brain as in mood disorders (37). This metabolic activity is related to patient's depressive symptoms and after cessation of methamphetamine glucose, brain glucose metabolism improves but not in all parts of the brain (38).

Frequency of depression and anxiety in methamphetamine users is high and their diagnosis accompanying substance-induced symptoms of depression is difficult. It is obvious that behavioral counseling is the standard treatment for methamphetamine dependence (7, 20, 21), but pharmacologic interventions seem to be helpful as additional interventions (20). Although after withdrawal, depression symptoms improve, depression must be addressed in the process of care. Medical treatment of depression for these patients needs more attention. Some routine treatments of depression may have adverse outcomes in these patients. Using selective serotonin reuptake inhibitors (SSRIs) is very common for depression and anxiety disorders but in methamphetamine users, it is probably associated with craving and increased risk of relapse during treatment and psychosocial interventions, thus some consider it as contraindicated (39, 40).

There are researches that suggest some medications have role in the management of mood disorders in methamphetamine users. Citicoline could have an antidepressant role in these patients (41); both quetiapine and risperidone can improve manic, mixed, and depressive symptoms and also decrease drug cravings (42) but reported to be abused by some (43) and positive effects of dopamine agonists on the activity of the brain and behavior, which could be a hope for pharmacologic treatment of stimulant dependence (44).

Patients showed a better "quality of life" score after withdrawal period. The improvement in subscales of mental health, role limitations (emotional problems) and physical functioning are significant. A study on methamphetamine users at admission for treatment, showed quality of life in this group is less than normal population, especially in mental issues (45). A one-year study on 723 methamphetamine addicted people showed that treatment completion and continued care improve health related quality of life. Improvements in mental parts are greater than physical health status (46).

Our study shows positive effects of short-term abstinence on depression and quality of life in methamphetamine chronic abusers. As remaining withdrawal symptoms have a role in treatment success, it is important to follow patients care to achieve better results. High level of anxiety in abstinence period and after that must be addressed in treatment of methamphetamine users, which can help in their abstinence and also recovery of patients to enable them for a productive life. Our study was done in a therapeutic community and an environment, which is different from ordinary life. This must be considered in the change of quality of life; therefore, a longer time follow-up is needed after finishing the program. Lack of a

comparison group was another weakness in our study, so we cannot be sure if the change is the effect of abstinence only or other factors like being in a group had a role. The relatively small sample size may have some effects, especially where differences were non-significant. Accordingly, a randomized trial with a bigger sample size is needed to confirm our findings.

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Authors' Contributions

Azarakhsh Mokri proposed the study concept and supervised it. Maryam Bagheri designed and run the study. Aliakbar Khosravi analyzed the data and Kourosh Kabir shared the idea and interpreted results, and wrote the final manuscript.

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