

Does trait mindfulness level affect quitting cannabis use? A six week follow-up study

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Abstract

Background: Only 29% of cannabis dependent individuals seek treatment, yet significant decreases in cannabis use are seen in 31-36% of individuals that seek treatment. Follow-up studies have found that over 60% in substance use disorders end in relapse, leading to potentially chronic and relapsing cases. New and effective therapies should be researched in order to increase the success of relapse prevention treatments. **Objective:** In this study we aimed to evaluate the relationship between trait mindfulness level, substance dependence severity and quitting cannabis use. **Methods:** A hundred and sixty four patients, diagnosed with cannabis dependence, were involved in the study; sociodemographic datas were recorded and Addiction Profile Index (API), Mindfulness Attention and Awareness Scale (MAAS) were carried out. **Results:** We found that the trait mindfulness level is significantly related with quitting cannabis use. **Discussion:** Trait mindfulness may be an important determining factor of the ability to quit substance use and achieve remission.

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Introduction

Cannabis use has proliferated since ancient times. It is currently the most commonly used illicit drug that affects human psychological health. Many clinical trials have shown that cannabis is a gateway drug to use of other substances and has comorbidity with other psychiatric disorders, especially schizophrenia¹⁻⁶. The psychosocial treatment models for cannabis dependence include motivational enhancement therapy, cognitive behavioral therapy and contingency management for adults.

In addition, brief strategic family therapy, family behavior therapy, family support network intervention and community reinforcement approach counseling, functional family therapy, multidimensional family therapy, and multisystemic therapy are other psychosocial treatment models for youths⁷.

Only 29% of cannabis dependent individuals seek treatment⁸, yet significant decreases in cannabis use are seen in 31-36% of individuals that seek treatment^{9,10}. Follow-up studies have found that over 60% in substance use disorders end in relapse, leading to potentially chronic and relapsing cases¹¹⁻¹³. Treatment models have been developed to prevent relapse. However, clinical data has shown that treatments used in substance use disorders provide far from satisfactory results¹⁴. Although cognitive behavioral therapy¹⁵ shows significant short-term effects on many substance users, 50-70% relapse ratio is still a serious problem of this therapy model¹⁶. New and effective therapies should be researched in order to increase the success of relapse prevention treatments¹⁵.

In 2004, Hayes¹⁷ described the third wave of cognitive behavioral therapies¹⁷ as mindfulness-based therapies; new research and applications using mindfulness concepts are being developed for substance use disorders¹⁸. Although there are multiple definitions, mindfulness is commonly defined as the capacity to place one's attention and focus on the present moment in a non-judgmental, non-reactive, and compassionate manner¹⁹⁻²². Mindfulness has been described as a capacity that is present since birth and that

can be developed by meditation practices and mindfulness-based interventions^{19,23,24}. Mindfulness-based relapse prevention (MBRP)²⁵, a new treatment model, has been recently developed; this model combines mindfulness meditation and cognitive-behavioral relapse prevention techniques²⁶. The mindfulness practices of MBRP aim to increase an individual's awareness of external triggers and internal cognitive and affective processes; increase the ability to tolerate challenging cognitive, affective, and physical experiences²⁵; and enhance metacognitive abilities²⁷. Recent studies suggest several possible mechanisms about mindfulness based interventions in addictive behaviours. Neurobiological mechanisms in areas associated with craving, negative affect, and substance use relapse may be affected by mindfulness training, altering basic neurobiological processes related to reactive behaviors. Data from clinical trials likewise suggest mindfulness training may lead to decreases in self-reported severity of factors related to relapse such as anxiety, depression, and stress, decreases in both craving and reactivity to craving and an improved ability to decouple the drinking impulse from drinking behavior²⁸. Recent theories have emphasized the multi-dimensional nature of dependence and how it is influenced by positive/negative reinforcement and automaticity. Indeed, mindfulness is thought to be linked with dependence by enhancing attention control and reducing automaticity. Tiffany's cognitive processing model of addiction is an important theory that describes the relationship between mindfulness and substance use. This theory outlines how routine behaviors, including substance use, become automatic over time and thus difficult to refrain from; continued use or relapse stems from the inability to disrupt these automatic behavioral routines²⁹.

The negative reinforcement model of relapse suggests that negative sensations are the most powerful motivator of chronic substance use. According to this model, individuals use substances to avoid aversive moods, such as anxiety and depression³⁰. This theory intersects with the self-medication theory that suggests that individuals use substances to avoid aversive experiences and sustain positive experiences³¹.

The effect of MBRP and modified MBRP protocols in substance use disorders was evaluated in four independent research studies. MBRP treatment was reported to decrease substance use or events related with substance use, such as cravings and responses to substance triggers^{27,32-35}. Some researchers have proposed that mindfulness reduces the necessity of avoiding aversive sensations by increasing positive sensations and reducing negative sensations³⁶⁻³⁸. Trait Mindfulness has been thought to be a naturally occurring difference among individuals or a dispositional trait²⁴ that can be developed through meditative practices and mindfulness-based interventions^{19,23}. Individuals with high levels of trait mindfulness are theorized to be better able to view aversive experiences as being transient and to be less likely to engage in substance use behaviors as a means of coping with such experiences^{20,39,40}.

Based on this information, we hypothesized that the level of trait mindfulness of individuals are positively related with their capacity to quit cannabis use and negatively related with their severity of cannabis dependence. In this study we aimed to evaluate the relationship between trait mindfulness level and cannabis use of two groups during the follow up period; group continue (GC) and group quit (GQ). In addition, we analyzed the relationship between trait mindfulness and severity of cannabis dependence in both groups.

Methods

Participants

Outpatients that were sent to our treatment center by the probation office were under probation due to illegal substance use and were involved in the study after signing an informed consent form. The patients were between 18–65 years old, could write and read and were diagnosed with cannabis dependence according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition – Text Revision (DSM IV-TR). The study ran from 01 January 2014 to 31 March 2014 at the Department for the Treatment of Alcohol and Substance Use Disorders of Ankara Numune Education and Research Hospital. Patients with educational and language problems that prevented diagnostic psychiatric interviews, another axis-I diagnosis other than cannabis dependence, diagnosis of mental disorder due to general medical conditions, or mental retardation were excluded. The approval for the study was obtained on 18 December 2013 from the Presidential Ethics Committee of Ankara Numune Education and Research Hospital (decision number 70/2013).

Measures

After the patients signed informed consent and accepted participation in the study, sociodemographic data on patients were recorded. To measure the dependence severity, the participants were asked to fill out the Addiction Profile Index (API) developed by Kultegin Ogel, Cuneyt Evren, Figen Karadag and Defne Tamar Gurol. The API consists of the following five subscales of substance use: the characteristics of substance use, dependency diagnosis, the effects of substance use on the user, cravings, and motivation to quit using substances⁴¹. The API total scores are divided into three categories that describe the severity of dependence: a) < 12 points indicate low dependence, b) 12-14 points indicate moderate dependence, and c) > 14 points indicate high dependence⁴¹. The participants were also asked to self-assess themselves on the Mindfulness Attention and Awareness Scale (MAAS). This scale, developed by Brown and Ryan²⁴, evaluates the level of mindfulness and consists of 15 items; high resulting values indicate a high level of mindfulness. The mean MAAS value of the whole sample was accepted as the determining threshold of high and low mindfulness. A validity and reliability study was conducted according to the Turkish study by Zumra Ozyesil *et al.*⁴². The MAAS measures only the “acting with awareness” facet of mindfulness; without “observing”, “describing” and “accepting without judgement” facets. In addition to the sociodemographic data and the calculated API and MAAS scales, urine tests of cannabis

metabolites were performed to evaluate cannabis use. All these tests were completed in the first meeting, after which the follow-up period began. The follow-up period consisted of 3 meetings during the six weeks after the first meeting, as one meeting every two weeks. In all meetings, urine tests were repeated. During the follow-up period, mindfulness-based interventions were not conducted with the sample.

Procedures

We followed up patients diagnosed with cannabis dependence for six weeks following diagnosis. The individuals involved in the study were further divided into two groups at the end of the follow-up period based on the results of the urine test of cannabis metabolites. During follow-up, excluding the first meeting, individuals with at least one positive urine test were included in Group Continue (GC), and individuals with negative tests were included in Group Quit (GQ). We aimed to evaluate the relationship between trait mindfulness level and cannabis use of two groups. At the beginning of the study, 190 cannabis dependent-patients were undergoing treatment at our study center, although 2 patients could not read or write, 4 patients refused to join, and 20 patients could not complete the follow-up period and were thus excluded. In total, 164 individuals were included in the study. Only male patients were included, as no female patients diagnosed with cannabis dependence visited our center during the study period.

Data analysis

We evaluated the relationship between dependence severity and trait mindfulness cross sectionally at the first meeting and followed up the patients for six weeks to assess the relationship between trait mindfulness and cannabis use by repeated urine tests. All statistical analyses were conducted with IBM SPSS for Windows, version 21.0. Numerical variables were summarized as the mean \pm standard deviation; categorical variables were summarized as numbers and percentages. Parametric hypothesis tests (normality and homogeneity of variances) were performed before comparison of the groups to test if their variances were equal. To determine differences in the numerical variables of the two independent groups, a t-test was applied for parametric data. The Kruskal Wallis test was also applied; this test is used for comparing groups of two or more independent samples. The relationship between numerical variables was determined by calculating the Pearson correlation coefficients. The significance level was determined as $p < 0.05$. The relationship between cannabis dependence severity and trait mindfulness of two groups (GC and GQ) were analyzed by t test. The relationship between API total score and MAAS scores in the whole sample analyzed by Pearson correlation coefficient. The relationship between API-subgroups and trait mindfulness in the whole sample was analyzed by Kruskal Wallis test.

Results

In our study, GC was composed of 79 patients who tested positive for cannabis in at least one of their urine samples (excluding the first meeting) during the 6-week follow-up period. GQ was composed of 85 patients who quit substance use during the follow-up period and thus qualified as early partial/full remission candidates; none of their urine tests (excluding the first meeting) were positive for cannabis.

The mean age of GC was 29.1 ± 8.5 and of GQ was 26.7 ± 7.0 . All patients were male. No significant differences were found between two groups in regard to the sociodemographic data on age, marital status, educational level, living situation, and job status in the previous year.

Fifty-two individuals (65.8%) in GC considered cannabis to be a problem in their life in comparison with 45 individuals (52.9%) in GQ; the difference in this parameter was not statistically significant (Table 1). Fourteen individuals (17.7%) in GC had a history of legal

problems related with cannabis use in comparison with 5 individuals (5.9%) in GQ; this difference was statistically significant, with a greater ratio of individuals experiencing legal problems in GC (Table 1).

Table 1. Comparison of group continue and group quit due to having history of legal problems depending on cannabis use and thinking cannabis use is a problem

	Group Continue (n = 79)	Group Quit (n = 85)	p*
I have lived legal problems depending on cannabis use	14 (17.7%)	5 (5.9%)	0.034
Cannabis use is a problem in my life	52 (65.8%)	45 (65.8%)	0.228

p*: p value obtained bay applying chi-square test.

The relationship between level of trait mindfulness and history of using substances other than cannabis was examined for the whole sample; trait mindfulness level was significantly lower in the group that had history of using substances other than cannabis (Table 2).

Table 2. The relationship between MAAS score and history of substance use other than cannabis in whole sample

	Do not have history of substance use other than cannabis (n = 48)	Have history of substance use other than cannabis (n = 116)	p*
MAAS (Ave ± SD)	76.0 ± 12.8	69.6 ± 15.2	0.012

MAAS: Mindfulness Attention Awareness Scale.

*: p value obtained by applying t test.

Ave: average; SD: standard deviation.

Statistically significant differences were found between GC and GQ in the total API scores of the subscales of substance use characteristics, dependence diagnoses, effects of substance use on the user, and cravings. These values were higher in GC than GQ (Table 3).

In addition, the MAAS score was statistically higher in GQ in comparison with GC ($p < 0.001$) (Table 3).

There was a negative relationship between the total API and MAAS scores for the whole sample. As the API score increased, the MAAS score decreased ($p < 0.001$) (Table 4).

The patients were divided into three groups based on their API scores of dependence severity: low, moderate or high. As API scores increased from low to high, the MAAS score demonstrated a corresponding decrease (Table 5). Upon comparing the API groups given their total MAAS scores, significant differences were found between API groups of low and high severity ($p < 0.001$) and between the groups of moderate and high severity ($p < 0.05$), although no significant difference was found between the groups of low and moderate severity.

Table 3. Comparison of API subscales' values. API total values. MAAS total values between the groups

	Group Continue (n = 79)		Group Quit (n = 85)		p*
	Ave ± SD	Median [Min – Max]	Ave ± SD	Median [Min – Max]	
The characteristic of substance use	5.4 ± 0.3	5.4 [4.3 – 6.4]	4.9 ± 0.7	5.3 [2.3 – 6.9]	< 0.001
Dependency diagnosis	21.9 ± 1.8	21.5 [18 – 29]	21.1 ± 1.4	21 [13 – 23.5]	0.018
The effects of substance use on the user	26.3 ± 7.1	24 [11 – 48]	22.1 ± 4.9	20 [15 – 37]	< 0.001
Cravings	9.8 ± 2.9	9 [4 – 19]	7.7 ± 2.1	8 [4 – 13]	< 0.001
Motivation to quit using substances	11.6 ± 2.9	12 [5 – 15]	10.8 ± 3.6	12 [3 – 16]	0.216
API total	15.3 ± 2.0		13.7 ± 1.8		< 0.001
MAAS total	69.4 ± 15.3	74 [36 – 90]	78.4 ± 10.7	80 [46 – 90]	< 0.001

API: Addiction Profile Index; MAAS: Mindfulness Attention Awareness Scale.

*: p value obtained by applying t test.

Ave: average; SD: standard deviation.

Table 4. API total score and MAAS total score relationship in the whole sample

	r*	p
MAAS total	-0.456	< 0.001

API: Addiction Profile Index; MAAS: Mindfulness Attention Awareness Scale.

r*: pearson correlation coefficient.

Table 5. The Relationship Between API-subgroups and Mindfulness

	API low (n = 17)	API moderate (n = 48)	API high (n = 99)	p*
MAAS total Median [Min-Max]	83 [60 – 90]	81 [38 – 90]	75 [36 – 90]	< 0,001

p*: p value obtained by appealing Kruskal Wallis.

MAAS: Mindfulness Attention Awareness Scale; API: Addiction Profile Index.

Discussion

To our knowledge, this is the first study in literature to evaluate the relationship between the level of trait mindfulness, severity of cannabis dependence and capacity to quit cannabis use. During the follow-up period of our study, we found that the level of trait mindfulness was significantly higher in GQ, or those that quit cannabis use, in comparison with GC, composed of individuals that tested positive for cannabis in at least one drug test. This result is consistent with other research studies that have reported that higher levels of mindfulness are negatively related with substance use frequency^{43,44}. All individuals are born with the capacity to exercise mindfulness, although they may possess varying levels of the trait. Trait mindfulness may be an important determining factor of the ability to quit substance use and achieve remission. Furthermore, when we compared the relationship between level of trait mindfulness and history of use of substances other than cannabis across the whole sample, trait mindfulness was significantly lower in the group with history of using substances other than cannabis. Mixed substance abuse can result in serious problems, such as suicide⁴⁵. Mindfulness-based interventions are reported to reduce alcohol and other substance use/abuse cases¹⁴.

We found a statistically significant relationship between trait mindfulness and dependence severity. In the whole sample, as the mindfulness level lowered, the severity of dependence level increased. Similar with our data, Vidrine *et al.*⁴⁶ reported higher mindfulness levels in nicotine-dependent individuals with lower dependence severities. Other studies have reported that individuals with high dependence severity have more problems in social, work and family life^{47,48}, and more intensive treatment and support are needed in these cases⁴⁹. This evidences that increasing mindfulness may correlate with decreasing dependence severity and other problems caused by substance dependence. In the other hand high dependence severity level is related with severe chronic substance use; the level of mindfulness might have been decreased as substance

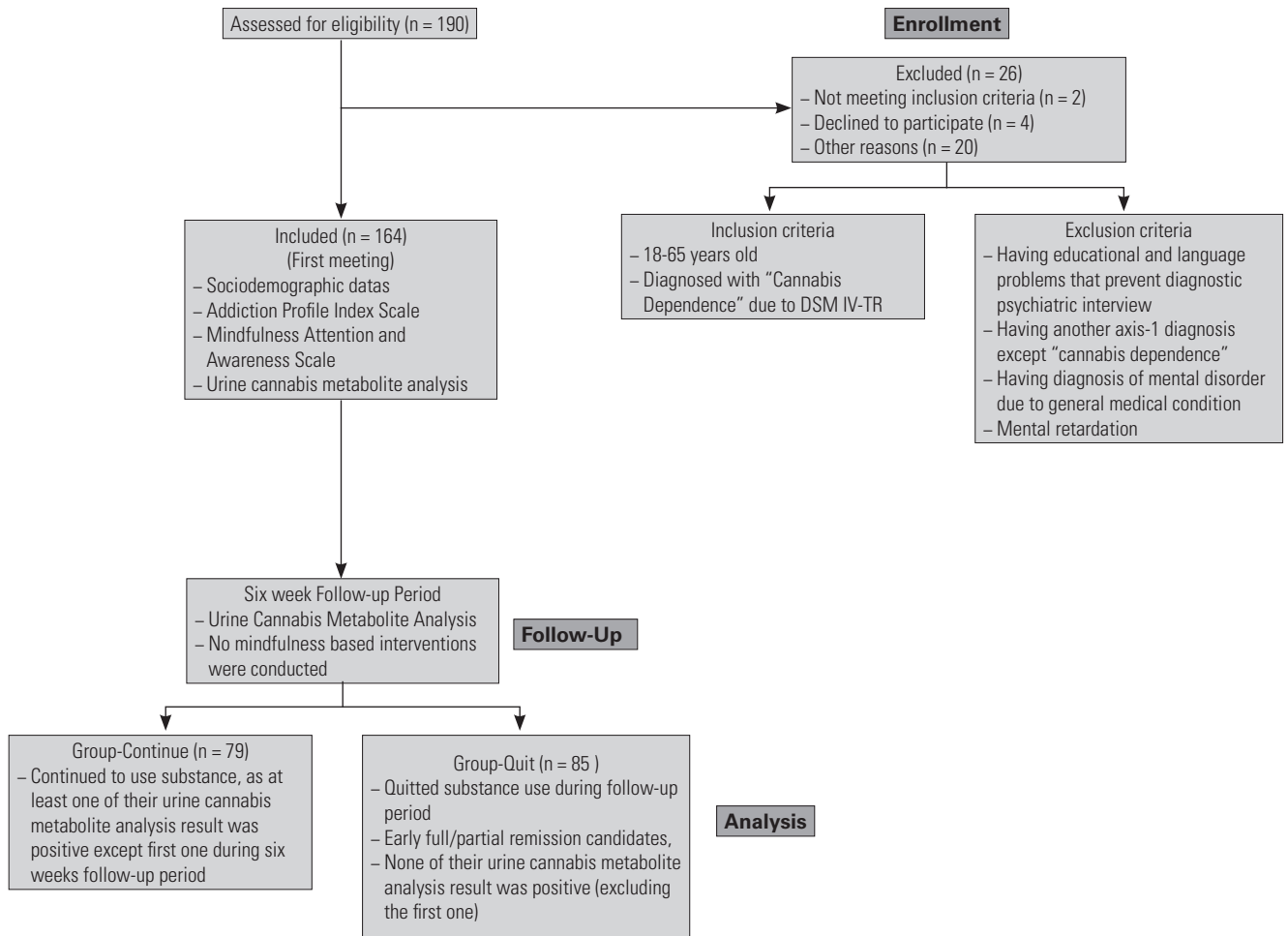


Figure 1. Flow diagram of the study.

use might negatively influence attention and awareness. We divided our sample into three groups according to dependence severity as scored by the API: low, moderate, and high. As API scores increased from low to high, MAAS scores significantly decreased. There were significant differences between API groups of low and high severity ($p < 0.001$) and between groups of moderate and high severity ($p < 0.05$); however, no significant difference was found between groups of low and moderate severity. This may be indicating that individuals with low and moderate dependence could benefit from similar interventions, yet highly dependent individuals may need more intensive interventions. Additional complications and loss of functionality are observed in individuals with high levels of dependence, and treating this group is more difficult. Increasing levels of mindfulness may be an important, effective and new treatment model for individuals with high dependence in order to encourage abstinence and reduce the severity of substance dependence.

We found that the API scores considering substance use characteristics, dependence diagnosis, effects of substance use on the user, and cravings were statistically significantly lower for GQ than GC. Furthermore, the prevalence of substance abuse and associated life problems, history of legal problems, level of substance dependence, and effects of substance use on the user were all lower in GQ in comparison with GC; these results are consistent with the nature of dependence. Cravings is another parameter that results in incompletion with treatment and relapse during treatment of substance dependence⁵⁰⁻⁵². In our study, cravings were higher in GC

than GQ. These findings were consistent with the studies of Bowen *et al.* (2009) and Vidrine *et al.* (2009) that focused on the relationship between different aspects of mindfulness and substance use. The severity of cravings may be decreased by increasing an individual's level of mindfulness. This finding may imply that mindfulness-based treatments could be proposed as new and effective treatment models for cannabis dependence.

It seems to be a paradox that the ratio of individuals that consider cannabis use to be a problem is not statistically significantly different between in GC and GQ, even though the level of mindfulness of GC was significantly lower than GQ. GC also reported a statistically higher history of legal problems, which could be explaining this result.

Limitations

In the study period, no female individuals with cannabis dependence were involved, so the relationship between gender and level of mindfulness could not be evaluated. The API scale was a self-reported scale, and this may be one limitation of our study. MAAS was the only scale used to measure mindfulness in our study, based on a Turkish validity and reliability search. MAAS measures acting with awareness, only one component of mindfulness, so this may be another limitation. The data in our study were collected cross-sectionally, yet whether or not mindfulness-based treatment methods could improve mindfulness levels or provide benefits in cannabis-dependent patients is unable to be directly determined.

Recommendations

As we determined the negative relation between trait mindfulness level and cannabis use behavior, this may encourage the expansion of mindfulness based interventions in cannabis dependence. Also long-term follow-up studies are needed to evaluate if chronic substance use decrease mindfulness levels of individuals. In addition further cross-sectional and follow up studies are needed in substance use disorders other than cannabis which evaluate the effect of trait mindfulness on treatment results.

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