



## Effectiveness of Psilocybin on Depression: A Qualitative Study

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### ABSTRACT

**Introduction:** Psilocybin mushroom use is well documented in spiritual and religious ceremonies globally. This drug is now the most popular in Europe and the USA.

**Objective:** The objective of this study is to explore the experiences and effects of psilocybin on patients with depression and anxiety.

**Method:** A qualitative study was conducted interviewing ten participants currently taking psilocybin while experiencing depression and/or anxiety. Ethical approval was obtained from the University ethics committee. Participants were recruited via social media and groups are known to have used psilocybin for the treatment of anxiety and/or depression. Participants were informed of study aims and consent was obtained before interviews commenced. Confidentiality was maintained throughout this study. Interviews began with informing participants that psilocybin may be effective in the management of depression. Initially, information around the way treatment with psilocybin was obtained was sought. This was followed by queries around the effects of the drug in terms of experiences both during and after treatment. Finally, participants were asked to outline the positive effects of psilocybin on their lives.

**Results:** The data were thematically coded using Grounded Theory as an underpinning philosophical paradigm. Emerging themes included enhancement of smell, vision, hearing, and taste sensations. Another theme emerging was the experience of being 'connected with the universe' while on the drug. Additionally, participants reported a stabilization of mood, an increase in optimism and emotional control, and a healthier emotional connection with others. Most also felt an increase in comfort, peace and calmness. Another theme that emerged centered on the mechanism of action of psilocybin. Participants stated that this substance seemed to 'make new connections in their brain,' resulting in new perspectives. Some participants felt this resulted in a calming influence on the mind and body. This aligns with research showing that psilocybin works by changing the thinking and improving information processing.

**Conclusion:** Psilocybin has promising effects on the patients with depression/anxiety even after a single dose. Psilocybin is safe but the administration should be guided by a health professional to yield safe and positive outcomes.

**Keywords:** Psilocybin, depression, qualitative, mushroom

## INTRODUCTION

Psilocybin is a naturally occurring plant alkaloid that gained the attention of researchers recently as a treatment for several psychiatric disorders [1]. Research regarding psilocybin was first published in the late 1950s [2]. Psilocybin mushrooms have a long history of use in spiritual and religious ceremonies and are now the most popular in Europe and the USA [2-4]. Psilocybin is a structurally diverse group of compounds known as 5-HT<sub>2A</sub> agonists producing positive effects in emotions, perceptions, and thoughts [5, 6]. The mechanism of action is similar to all serotonergic psychedelics in that Psilocybin acts as a serotonin 2A receptor (5-HT<sub>2AR</sub>) agonist [7].

Currently, Psilocybin mushrooms are prohibited in most countries. While these mushrooms can be consumed fresh or dried (with an unpleasant taste), they can also be ingested after

dissolved in tea. Mixing in chocolate cream or peanut butter has also been found to make them more palatable. Psilocybin is considered to be one of the least dangerous and the most beneficial drugs in the illicit drug category [8]. Studies have shown that it does not produce any severe mental or physical health effects [9]. Furthermore, several studies have reported that psilocybin produced positive and sustained improvements in overall health and well-being [8]. In fact, enhanced wellbeing was even reported amongst healthy individuals after receiving a single dose of the drug [8]. Therefore, research shows psilocybin can have rapid and lasting positive effects on mental health among those not struggling with depression [10-13].

The positive effects of this drug are well documented as shown by the fact that 80 percent of long-term heavy cigarette smokers demonstrated abstinence from smoking six months following two psilocybin therapy sessions [14]. After one or two

psilocybin doses, alcohol-addicted patients displayed substantially decreased drinking habits over the next eight months [15]. A study conducted among patients with treatment-resistant depression reported substantial decreases in depressive symptoms one week and three months after 10-25 mg of psilocybin was given in two sessions, seven days apart [16]. Potential effectiveness has also been demonstrated in the treatment of anxiety-related patients suffering terminal diagnoses and obsessive-compulsive disorder [17-20]. There was significant reduction in both depression and anxiety amongst end-stage cancer patients at 3 and 6 months after a single dose of psilocybin [18]. The purpose of this research is to explore the experiences and effects of psilocybin on depression in effected patients.

## METHOD

This study was conducted in March 2019 with the aim of exploring the experiences and effects of psilocybin among depressed patients. Ethical approval was obtained from the University ethics committee. Ten participants were interviewed for this qualitative study. Confidentiality was maintained and informed consent was obtained from all participants. Interview questions were designed based on previous studies and the full questions can be found in the appendices of this article [21].

Participants were recruited through social media and specific groups who have used psilocybin for depression. Inclusion criteria required the participants to be at least 18 years of age. Ten participants responded to invitations to conduct an in-depth interview (approximately 60 minutes) regarding their experience with psilocybin. Interview processes included informing participants that psilocybin may be effective in treating depression; and asking participants to describe details of their experiences during and after receiving this drug. Participants were also asked to describe any positive effects of psilocybin on their day-to-day experience. Information was also sought as to whether the drug was self-administered or given by a health professional. The interviews were recorded and transcribed. Themes were generated using Grounded Theory as an underpinning philosophical paradigm.

## RESULTS

While participants were informed about the potential effects of psilocybin on depression, most of them learned about these consequences while seeking to treat their own depression. Information was gathered via the internet, social media, and some scientific articles. One participant stated:

*I had been curious and was looking for something to help with my depression and suicidal thoughts...I didn't want to die. I couldn't find happiness with my circumstances and pain. I decided to try it out after reading trip reports about how it made them feel whole and like there is something more like God's presence. Participant (2)*

Participants reported a variety of physical experiences during and after taking psilocybin. Some reported extreme emotional responses (i.e. laughing followed by crying). One participant experienced giggling, while another described being deeply melancholy. Other experiences included

yawning, high temperatures, and enhanced visual changes regarding colors. A common experience amongst participants was nausea and shortness of breath. However, these physical experiences were not all that was reported.

Some participants described more of an existential experience. One stated feeling as if there was an enhanced connection with the universe after taking the drug. Visual and auditory enhancement was reported by participants as below:

*I first felt my temperature feel like it went up a little. Then my eyesight started to catch more colors and I remember going to see myself in the mirror. I giggled a lot. My vision got a little distorted, wavy, it seems like things were moving slightly like the room is breathing. I didn't realize [I was] having auditory hallucinations but it was like my mind was a bit drunk so I wasn't processing the information, but it was funny. Participant (2)*

*It brought back memories of the strong emotions that I have kept inside. There was a flood of positive feelings that came with crying and laughter. Participant (3)*

*Usually, after 1-2 hours there was an onset of nausea in the tummy and constant yawning. After 1.5 hours the yawning and tired feeling goes away. This can be controlled by taking a small dosage. Participant (5)*

*In many cases, there is a deep melancholy which you learn to embrace, people call this emptiness. You come to the realization that your entire being is connected with the universe, and that this emptiness is ultimately not empty, but filled. This conclusion alone brings me into a positive realization and out of a depressed state for quite a while. Participant (10)*

*I began to feel emotionally "dilated". I felt the need to be in the water but also to be alone, so I got in the shower. The shower dial turned into "the eye", the source of knowledge, and I felt energy rising through the stomach and circling breasts like little schools of energy fish. It continued up my chest and got "lodged" in my throat and immediately tears began to stream down my face. I asked the Eye "What is that?" And the Eye said "You know who that is.... that is grief. And you don't need to be afraid of it. Embrace it and make friends with it. Allow it the attention it needs ...." so I cried and cried and cried...and I realized one of the things that were holding me in depression was the inability to properly grieve. Participant (6)*

*During the session, I felt like my spirit left my body. Participants (7)*

Most participants reported clearer thinking after psilocybin was administered. One participant was able to cease taking three anti-depression medications and sleeping pills two weeks after taking psilocybin. Participants also reported some 'mind-expanding' effects which contributed to a more positive outlook on life including a deeper sense of peace and appreciation of self. Others reported enhanced feelings of comfort and understanding along with more frequent meditation and living in the present. Some participants reported mind-expanding effects as below:

*My whole thought pattern changed. I was so relieved. My head had never been clearer. I was so happy the day after I cried to my trip buddy about how I could see again. I felt warm fuzzy and lighter than I did before. I was on three different anti-depressants, valium, and sleeping pills. This stopped within 2 weeks of my first dose. Participant (1)*

*It is a mind-expanding experience and I felt like it changed my brain. Participant (2)*

*A deep sense of peace and appreciation for myself and my life. Participant (3)*

*The session is usually finished after 6 hours. This state I call the afterglow and is the actual state you want to reach since this is the state that most shows you the realization of what utter nonsense your depression is. I feel like I am in complete meditation which means presence, and this state lasts 2-4 days where I feel like I completely know my life's purpose. Participant (5)*

*Feel comfort, peace, and understanding. I felt incredibly calm and quiet. Participant (6)*

The positive effects of Psilocybin seem to involve new connections made in the brain of recipients which subsequently birthed new perspectives. These connections resulted in calming the mind and body. This drug reportedly works by changing the thinking and allowing for more efficient processing of information. Some of the participants said:

*I think it works by calming your mind and body, I was never relaxed like that before. I want to say it was my soul getting to know me after years of neglect. Participant (1)*

*I feel like it has changed my thinking and processing information better and not reacting emotionally. It looks like it was an antivirus for the brain. It rewired my brain. Participant (2)*

*It enhanced my appreciation for emotions. It works by making new connections in the brain that creates new perspectives. Participant (3)*

The frequency of administration was variable. Some participants took 2 doses a month. Others began with an increased initial dose (8 gm) followed by 0.25gm twice a week. The higher dose was then repeated every three months. Most participants did not exceed a dose of 1.5-2.0 gm at one sitting.

## DISCUSSION

Psilocybin (4-phosphoryloxy-N, N-dimethyltryptamine) is a tryptamine hallucinogen that can be found in psilocybin mushrooms [22]. After oral administration, the onset is between 30 and 60 minutes. Then drug peaks between 90 and 180 minutes with a duration of 6 hours [10]. The effects are dose-dependent and may include visual, cognitive, and emotional alterations that could mimic psychosis [7, 23]. Psilocybin breaks down into psilocin [22, 24]. Psilocin acts as 5-HT agonist and having a high affinity for the 5-HT<sub>2A</sub> receptor subtype. This receptor is believed to be responsible for the psychotropic effects [5]. Another natural product like ketamine

also can rapidly relieve depressive symptoms among depressed patients [25].

The focus here is on the psychological and functional plasticity associated with the acute 'psychedelic' state produced by psilocybin, coupled with the enduring changes that appear to follow from exposure to this drug [1]. Psilocybin has been shown to reduce depression and anxiety along with lessening mood swings [10, 26-32]. A single dose has been found to be more effective in treating anxiety and depression when compared to a placebo [33]. Research has demonstrated a rapid decrease in depressive symptoms when using psilocybin [11, 12, 16-19, 34, 35]. While these studies involved small sample sizes thus limiting generalisability, Muttoni et al. [36] showed Psilocybin produced immediate and significant anti-depressant and anxiolytic effects that lasted for several months. However, the benefits do not stop here.

Participants in another study reported improved quality of life, increased self-confidence, enhanced connections with others, and overall healthier behaviors after psilocybin use [19]. Positive changes in mood and attitudes along with significant improvement in psychological well-being have been observed after this drug was administered [7, 36]. More than half of participants in some studies considered their psilocybin experience the most significant in their lives [36]. This improvement in the quality of life has been shown to decrease depression and inspire hope in some users.

Concerning the quality of life, 47% of psilocybin users in one study reported their peak experience in life (Maslow's hierarchy of needs) occurred while using this drug [34]. Other studies have attributed positive changes in attitudes toward self, partners, relationships, and faith, with 80% of users attributing improvement in life satisfaction to psilocybin. These positive changes were corroborated by participants' colleagues, family, and friends [17]. Psilocybin has been reported to promote continuing positive changes in personality, well-being, and attitude after a single dose [7, 38]. Furthermore, a systematic review reported that micro-dosing of psilocybin can improve attitude, memory, imagination, motivation, transparency, and alteration in time expectations [37].

Results from participants in this study included positive experiences during the administration of psilocybin along with a feeling of being 'connected with the universe.' Participants also reported enhanced color perception in visual fields. Side effects included nausea and shortness of breath. This was in line with previous study findings reporting nausea, abdominal pain, headache, vomiting, physical and psychological discomfort, anxiety, and paranoia could occur with psilocybin use [19, 35, 37].

Further beneficial effects in this study included clearer thinking, cessation of current anti-depressants and sleeping medications, mind-expanding effects, and a more positive outlook on life. Participants also reported a deep sense of peace, comfort, calmness, appreciation for self and life overall. A more focused approach to living included more meditation and living in the present. Participants also reported 'making new connections in the brain,' which resulted in creating new prospective, calming mind and body, and improved processing of information. These factors contributed to what was perceived as a positive move away from past dysfunctional trends [38]. A similar effect was reported by a previous study, which showed that electroconvulsive therapy increased the

global functional connectivity in the posterior-middle insula, supra-marginal gyrus, and dorsal medial prefrontal cortex [39].

Psilocybin interactions appeared to offer participants enduring, persistent perspectives that contributed to improved self-identity. Participants in this research showed improved personality traits, increased transparency, extraversion, improved conscientiousness, and reduced authoritarian attitudes. A significant increase in tolerance, transparency, confidence, and conscientiousness were also reported. Anhedonia, pessimism, conservative political beliefs, and fear declined. Most participants reported a reduction in neuroticism, and a rise in tolerance contributing to perceptions of redemption, and life acceptance [40] [Shore et al. 2019]. Enhanced spirituality reduced disease-related demoralization and loss of optimism coupled with improved quality of life [17-19].

Traditional treatment of depression would include psychotherapy coupled with the use of psilocybin [41]. Oram emphasizes that psychedelic treatment in the absence of a supportive environment and/or psychological support could have limited antidepressant efficacy [42]. Johnson and colleagues agree with the importance of the presence of psychological support [41]. It is therefore essential that all medication administration for depression does not occur in a vacuum.

The pharmacological mechanisms of the neuro-psycho therapeutic effects of psilocybin remain speculative. [5, 43, 44]. The psilocybin metabolite psilocin, as a 5-HT<sub>2A</sub> agonist, actively and implicitly influences multiple cortical and subcortical brain regions and improves cortical function [43-45]. Findings from psilocybin imaging studies show changes in brain activity that indicate antidepressant potential. Several successful antidepressant treatments using intravenous psilocybin have resulted in normalized hyperactivity in the medial prefrontal cortex and reduced blood flow in this area [43, 46]. Some research has shown psychedelics capable of improving brain-derived neurotrophic factor (BDNF) with resultant positive effects on synaptic plasticity. Psilocybin promotes network disintegration and anti-inflammatory action involving transient bottom-up processes [1, 47]. It also has a neuro-modulatory effect that enhances cognitive reasoning and may contribute to personal intuitions reducing negative thoughts [43, 48].

In our study, some participants used 2 doses per month while others administered a larger dose (8gm) first, then smaller doses (0.25gm) twice/week followed by a repeat of the larger dose every three months. Griffiths et al [19] reported that a larger dose (22-30 mg/70 kg) of psilocybin repeated every five weeks, followed by six-month dosing is effective in treating depression. Other studies [1, 18] have shown that a low-moderate dose of psilocybin (14 mg/70 kg) decreased anxiety at one and three months, with subsequent reduction of depression within six months.

Some cancer patients reported that four moderate doses of psilocybin doses (0.3 mg/kg) in tandem with psychotherapy produced rapid, robust, and enduring anxiolytic, and antidepressant effects [49]. There remains a difference of opinion around the effective dose required. Some studies suggested an initial oral dose of 10mg followed by an increased dose of 25mg after one week [16]. Most research seems to consider 30 mg as excessive while 10 mg is sub-therapeutic [19, 50].

Concerning the adverse reactions of psilocybin, findings corroborate our and others' previous results fostering the effectiveness and safety of this drug in the management of anxiety and depression [16-19]. Adverse reactions include transient anxiety, transient confusion, thought disorder, mild and transient nausea, dilated pupils, hyper-reflexivity, restlessness, lack of coordination, and temporary headaches [16]. Safety and efficacy remain intact with no significant distress in patients with advanced-stage cancer [18]. Healthy people receiving 30mg of psilocybin found no sustained physiological or psychological effects [48], and no complications have been reported amongst healthy individuals taking psilocybin [8, 22]. Even in cases of unsupervised and naturalistic conditions, psilocybin has a good safety record and a low-risk profile [51, 52].

## LIMITATIONS

Limitations in this study include a lack of ethnic diversity in participants (only English-speaking participants have been recruited) despite the possibility that the scope of psilocybin use goes beyond English speaking nations and peoples. Another limitation is that this study includes a relatively small number of participants. Further study needs to include larger and more diverse populations. Another limitation is that most of the patients were highly educated which can influence the participants' experiences during and after psilocybin administration.

## CONCLUSION

Psilocybin has promising effects on patients with depression even following a single dose. Psilocybin has proven to be safe when the administration is guided by a health professional and accompanied with psychotherapy.

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