



The Inclusion of Yoga with Traditional Drug Addiction Treatment: A Systematic Review of the Evidence

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Abstract

Background: Drug addiction is an ever-increasing problem in the United States. Though many people seek treatment for their addiction, many return to their addiction post treatment exposing an inadequacy of current treatment methods. This research hypothesizes that the inclusion of yoga with traditional treatment of addiction benefits current treatment programs a form of complementary therapy.

Methods: Peer-reviewed journal articles within the past ten years were used in this systematic literature review. The articles were taken from the following databases: PubMed, ProQuest, and Science Direct.

Results: A total of 15 peer reviewed journal articles were included in this systematic review. Each article focused on yoga as treatment for drug addiction. Many of the articles cited positive associations between the inclusions of one or all disciplines of yoga with traditional treatments for drug addiction.

Conclusion: Yoga has shown to have positive effects in the treatment of drug addiction as a supportive tool to keep individuals from relapsing into substance abuse. Further research is required to confirm these results.

Keywords

Drug addiction; Complementary therapy; Yoga; Peer-reviewed

Introduction

Addiction

Addiction is a global disease devastating the lives of millions and it are estimated that alcohol and illicit drug addiction amounts to 5% of the total diseases worldwide [1]. Regrettably, this burden is even greater in the United States, and according to the Center for Behavioral Health Statistics and Quality, one in ten Americans aged 12 or older is using illicit substances (2016). An illicit substance is categorized as one of the following: Marijuana, cocaine (including crack), heroin, hallucinogens, inhalants, and methamphetamine, as well as the misuse of prescription pain relievers, tranquilizers, stimulants, and

sedatives (CBHSQ, 2016). This research will focus exclusively on drug addiction (illicit substances, alcohol, and tobacco).

According to the Center for Behavioral Health Statistics and Quality (CBHSQ), marijuana is the most commonly used illicit substance with 22.2 million current users aged 12 or older. The misuse of prescription pain relievers follows second with 3.8 million current users aged 12 or older. Alcohol has attained 138.3 million Americans users aged 12 or older with 66.7 million reporting binge alcohol use and 17.3 million reporting heavy alcohol use within the past month. Most alarmingly, while the number of tobacco users in total is reduced, there is still one in five people reporting to be current cigarette users. Equally alarming, tobacco is still the leading cause of preventable death and the number of users has reached 64 million people (CBHSQ, 2016).

Although the number of drug addicts in the United States is exorbitant, many are seeking treatment. The CBHSQ states that 21.7 million people aged 12 and older needed treatment for a substance (illicit drugs and alcohol) abuse addiction (2016). It is reported that 2.3 million people aged 12 or older, needing substance use treatment, received the necessary treatment *via* an addiction treatment facility last year (CBHSQ, 2016). These treatment facilities design and implement programs for the purpose of helping addicted patients stop use and prevent relapse [2]. Unfortunately, it has been estimated that as many as 90% succumb to relapse within the first year [2]. This statistic demonstrates a need to reevaluate current treatment methods.

Current addiction treatment

According to the National Institute on Drug Abuse (NIDA), drug addiction can be treated (2018). Unfortunately, for those that are addicted, treatment is not that simple. Treatment requires that the patient not only stop the use of drugs but stay drug free in order to maintain a productive life in their family, work and society. Many patients require long term treatment or repeated treatments to completely discontinue the use of drugs (NIDA, 2018).

Current drug treatment programs include the following: behavioral counseling, medication, medical devices and applications used to treat withdrawal symptoms or deliver skills training, evaluation of treatment for co-occurring mental health issues such as depression and anxiety and long-term follow up to prevent relapse (NIDA, 2018). Treatment programs must be tailored to the individual and a range of follow ups may be crucial to the success of the program (NIDA, 2018). Follow up can include community or family base support systems (NIDA, 2018). In spite of this current all-inclusive approach, there is still a lacking that equates to the vast majority of those who seek help relapsing within the first year of recovery [2]. There is a need for a more holistic approach to drug treatment.

Yoga as treatment

Studies have shown that yoga can benefit the physical, spiritual and psychological well-being of a person [1]. In the traditional sense, yoga is comprised of eight limbs or disciplines: Yamas (ethics), Niyamas (individual observances), Asana (posture), Pranayama (breath control), Pratyahara (withdrawal of senses), Dharana (concentration), Dhyana (meditation), and Samadhi (self-realization

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or enlightenment). These disciplines serve as a recipe for living a purposeful life ensuring the yogi (practitioner of yoga) maintains a focus on their personal health and wellness. This research will limit its concentration to three of the traditional disciplines: Asana (posture), Pranayama (breath control), and Dhyana (meditation).

Yoga, originating in India, is an ancient practice that unites movement, respiration, concentration and meditation [3]. This practice has evolved over time into several different schools or styles of yoga. Consequently, most of these styles tend to include one or more the disciplines that will be the focus of this research. The purpose of yoga is to help the yogi focus on the present and maintain control over their feelings, thoughts, body and environment. The objective of this systematic literature review is to determine if the inclusion of yoga with current addiction treatment methods is favorable to traditional treatment methods alone.

Literature Review

Background: The problem of addiction, yoga and current treatment

Addiction is a behavioral and psychological syndrome that is characterized with a desire to use drugs and is often considered a social, physical, mental and spiritual illness. Unfortunately, this syndrome is one that is plaguing the United States as well as the rest of the world. It is estimated that 21.7 million people above the age of 12 need treatment for substance abuse issues (CBHSQ, 2016). This statistic equates to 1 in 12 people requiring substance abuse treatment (CBHSQ, 2016). Even more alarming, whilst only 10% of these people will receive treatment for their addiction, of those that seek treatment, more than 90% will relapse within the first year of receiving treatment [2]. Current treatment methods need a change.

Recently, there has been an emphasis on a more holistic view of medical treatment and this is especially true in the area of psychiatric treatments. Therefore, it would behoove researchers to discover the positive effects that alternative methods, such as yoga, can play in the quest for psychological wellbeing. Although there are a myriad of different styles and modes in yoga today, it is essentially the practice of arriving at the "here and now" It has become evident that the practice of yoga offers a new perspective on treatment as well as prevention of both mental and physical disorders [3].

Exercise as addiction treatment

As previously stated, the abuse of substances is a major public health issue, and exercise has been shown to help prevent as well as treat the use of substances. One study in Denmark attempted to test this treatment hypothesis [4]. Using 38 participants, 23 males and 15 females, they were able to test if the use of physical activity was able to help alter their substance use behavior. They collected self-reported data in combination with data from the European Addiction Severity Index at the beginning and end of the study. The participants were asked to participate in group exercises three times a week for two to six months. The results showed that addicts reduced their drug intake during the exercise training period. In the long term the results were more impressive. Of the 38 participants, 20 abusers reported abstaining from drugs since the program had ended and 10 had downgraded their usage. Though these results are positive, more research must be completed. It does insinuate, however, the use of yoga as treatment for substance abuse may produce positive results.

Another study was completed to study the effect of exercise on smoking cessation [5]. This study wanted to discern which type of exercise is best for cessation of tobacco use. A total of 19 studies were examined, 7 low risk bias and 12 high risk bias randomized control trials. In the end, their finding revealed low quality evidence for the efficacy of yoga in smoking cessation. The results also showed no effect on smoking cessation through the use of aerobic exercise, resistance exercise, and a combination of aerobic and resistance exercise. Though these results are negative it should be noted that when the yoga was combined with cognitive behavioral therapy, the results were positive regarding smoking cessation.

Yoga as a preventative measure

As stated, in more recent years, yoga has been studied for its effectiveness in the treatment of diseases [6]. Many studies have shown evidence that yoga to be successful in the prevention of many diseases, and this includes a study by Shohani [7] in which an investigation is done into the effects of yoga on anxiety, stress and depression which are often precursors of drug addictions. In this study, patients underwent the practice of Hatha yoga for a period of four weeks. The participants were women with a mean age of 33.5 who suffered from depression, anxiety and stress. According to the results, the women showed significantly decreased symptoms of depression, anxiety, and stress. The researchers concluded that yoga could be used as a complementary medicine, one limitation to this study is that only women were used. More research needs to be completed with male participants to see if this information can be applied globally [7].

Another study attempted to assess the effect of yoga intervention on prevention of alcohol and drug abuse risk in veterans and civilians with Posttraumatic Stress Disorder (PTSD) [8]. It is known that those with PTSD are often at a higher risk of substance use behaviors. PTSD affects individuals in the general population but more commonly those who have served in the armed forces. Unfortunately, it often affects women more than men. Nearly 10% of the general population suffers from PTSD and 9% to 27% of female veterans have received a diagnosis of PTSD.

In the aforementioned study, a pilot randomized controlled trial was analyzed comparing a 12-session yoga intervention with a control group [8]. The participants were women age 18 to 65 who has been previously diagnosed with PTSD. An Alcohol Use Disorder Identification Test (AUDIT) and a Drug Use Disorder Identification Test (DUDIT) were taken at the beginning and end of the trial. According to the results, the scores of both the AUDIT and DUDIT in the yoga group decreased while the AUDIT scores in the control group increased and the DUDIT scores in the control remained stable. The results of this study suggest that yoga may play a role in the reduction of risky behaviors for those with PTSD. This study, however, suffers from a limitation of only using women participants with male participants is needed.

Another area where a population may be considered at high risk for substance use is adolescents, and this period in life is key in the prevention of substance abuse however, current drug prevention programs do little to deter the initiation of drug use [9]. Despite slow decreases in the prevalence of substance use among adolescents, this statistic remains high According to one survey given to 44, 892 students in the United States, 9.7% of 8th graders reported using alcohol within the last month, 3.6% reported the use of cigarettes, and 8.1% of students reported the use of illicit substances within the past month [9].

One study attempted to assess the efficacy of yoga on the prevention of substance use among 8th graders [9]. In this study 7th grade students were randomly assigned to the yoga classroom or the control classroom. They would either receive 32 sessions in place of their regular physical education or in the case of the control group, remain in regular physical education. The students filled out a questionnaire at the beginning and end of the yearlong study. They were also given a follow up questionnaire, 6 months and 1 year, after the study concluded. Results showed that those in the control group were more willing to try cigarettes than that of the yoga group. These results are promising; however, more research is needed as only a small sample size was used.

Examination of previous reviews

Yoga is a practice that is rooted in Indian philosophy and has remained a part of their spiritual practice for millennia. On a grander scale, it is estimated that worldwide, there are 30 million current practicing yogis. In the United States alone there are an estimated 14 million yoga practitioners due to its increased popularity as a therapeutic practice. Due to this popularity, there are an increasing number of randomized controlled trials to test this belief in yoga's therapeutic properties [6].

According to one analysis, there were 366 studies published between the years of 1975 and 2014 [6]. The median sample size was 59 and most were conducted with healthy adult patients. However, a portion of the studies involved patients with one of 63 different medical conditions. The most common examined were breast cancer, depression, asthma, and type-2 diabetes. While many trials did not define the yoga style, Hatha yoga and yogic breathing were the most commonly named. To date, this is the most complete bibliometric analysis presented regarding yoga as a treatment. While the research available tends to be sparse for most conditions, yoga as treatment has seen an increase in published randomly controlled trials in recent years.

Another narrative review focused solely on yoga in the treatment of substance use disorders [10]. This analysis was smaller in that only 16 studies met its inclusion criteria. Of the 16, 12 were randomized control trials. While many included all substances, the majority focused on smoking cessation. Sample size of these studies varied greatly in that it ranged from 18 to 624 participants. The results of this analysis showed that yoga was effective in the reduction of substance use. It also showed promising results in the area of substance-related craving, especially amongst those attempting to quit smoking tobacco. It should be noted that most studies showed success in the short term. Future studies are needed to show the effects of yoga with substance abuse cessation in the long term.

Yoga as addiction treatment

Understanding that there is a positive association between those that practice yoga and psychological well-being, many studies have been completed to resolve if yoga will help in the treatment of addiction. According to a two-year study completed at the Takiwasi rehabilitation center, yoga provides positive effects when incorporated with the traditional treatment of addiction [11]. In this study, 23 patients (most "poly-drug" users), between age 18 and 52, were asked to practice yoga two times per week in addition to the traditional treatment. This yoga practice incorporated Pranayama, Asanas, and Dhyana. The average patient completed 4.5 months of yoga in total. They were surveyed before and after treatment and all

patients reported physical and psychological benefits due to their yoga practice. While these results are encouraging, this study lacked a control group and all benefits were self-reported.

Another study was designed in order to explain the physiological mechanisms behind the perceived benefits of yoga in conjunction with traditional treatment methods. According to Gangadhar and Porandla, yoga has shown to help lessen the depression associated with alcohol withdrawal [12]. When practicing yoga, both cortisol levels and brain-derived neurotrophic factor (BDNF) levels are reduced, causing antidepressant effects. Also, acute Asana practice sessions can elevate GABA levels which are key to mood stabilization. Furthermore, though the exact physiological mechanisms at work are not known, research shows Dhyana to have positive effects on neuroplasticity. Future studies are needed to help to confirm these findings and explicate these physiological effects.

While Gangadhar and Porandla attribute the ability of yoga to benefit treatment to its physiological aspects, Kissen and Kissen-Kohn attribute it to the self-soothing effects experienced by patients [13]. Studies have shown addicts experience dramatic body condition alterations with a placebo due to high expectations of these changes exposing the possibility to self-soothe, but a lack of wisdom to do so. However, with the practice of yoga, specifically synchronizing breathing exercises with physical postures, the patient begins to feel relaxed as well as gain control of motor and sensory aspects of the body. This will leave the patient with the knowledge that they have control of their physical bodies and mental states. They further explain that the ritualized act of yoga will give the patient a feeling of safety and stability often lacking in an addict's life. This study provides great insight into a psychological aspect of recovery.

Another aspect of drug addiction is mindlessness. Khanna and Greeson reasoned that addictions are spawned due to a state of mindlessness containing escapist attitudes, social isolation, emotional reactivity and automatic thinking [1]. This mindlessness creates an emptiness that is then filled by addiction. However, with the practice of Asanas, Dhyana, and Pranayama, a patient will steady their focus, strengthen concentration, reinforce emotional regulation and enable self-observation. This causes a state of mindfulness helping the patient lead an addiction free life, and researchers maintain that for optimal treatment, the other five disciplines of yoga should be incorporated as well into treatment. More research must be completed in this area as all eight disciplines of yoga are rarely utilized in current studies.

One study attempted to incorporate a more holistic approach to the inclusion of yoga with traditional drug addiction treatment [14]. This study incorporated the use of a Kundalini Yoga Lifestyle. Kundalini yoga is an ancient technique that incorporates the physical postures, breathing techniques, meditation and most importantly mantra. The study also incorporated the use of a vegetarian diet, herbs, vitamins and spices for cleansing, recreational music therapies, spiritual studies and religious practices. To prevent off relapse, training as a teacher of Kundalini Yoga, after care yoga support groups, and some massage therapy were included in all areas was strictly enforced by the hospital staff.

The results of this study were positive [14]. The participants showed improvements on several psychological self-reported questionnaires including the Behavior and Symptom Identification Scale and the Quality of Recovery Index. Such areas include impulsive and addictive behavior, daily living and role functioning, depression and anxiety, and relation to self and others. Though the results are

positive, the researchers make note that a comprehensive spiritual lifestyle may prove effective, but the participants must be receptive to the approach. Future research must be completed to decipher which of the elements was most effective as this approach incorporated many different elements.

A separate study attempted to limit the elements by just using asanas with normal treatment for alcohol dependence [15]. In this pilot study, 18 alcohol dependent participants were randomized into two groups: yoga with traditional treatment and traditional treatment alone. Intervention consisted of ten weeks of weekly group yoga sessions. Participants were also encouraged to do yoga daily on their own. The results found that there was a greater reduction in the consumption of alcohol in the group that received traditional treatment and yoga than the group that just received the traditional treatment alone. This led the researchers to discern yoga to be a possible treatment if it is included as a part of traditional treatment. Further larger studies must be completed in this area as this was a relatively small study. They also failed to assess the patients long term.

Pranayama as addiction treatment

Pranayama, or yogic breathing, is a practice to balance the autonomic nervous system as well as influence many psychological disorders including addiction [16]. Sudarshan kriya yoga (SKY) is a method which involves the use of three controlled breathing types performed in a rhythmic cycle. These three types are Ujjayi (Victorious Breath), Bhastika (Bellows breath) and "Om" chants. According to one study, the SKY technique reduced tobacco habits of 21% of participants over a six-month period. In another study, 60 patients seeking treatment for alcohol dependence participated in SKY for two weeks resulting in the patients experiencing anti-depressant effects.

Pranayama has shown to have positive effects with tobacco use cessation, and currently, there are a variety of treatments for tobacco cessation including group counseling, nicotine gum, or web-based computer programs [17]. Approximately 70% of smokers are aware of the risks and attempt to quit. Unfortunately, many are unsuccessful citing physiological or psychological reasons. Dai and Sharma completed a review of 10 treatment plans for smoking cessation, all of which included yoga. The most notable studies focused on pranayama. The rhythmic breathing proved to be easy, cost-effective and encouraged a relaxed state. When Dhyana, Pranayama, and Asana were all included in the treatment, individuals learned skills and gained insight into psychological, physiological and behavioral processes involved in the addiction and relapse. Though they completed a comprehensive study of the literature available, it would benefit future researchers to discover which disciplines work best with individual populations.

Another study in tobacco use cessation found similarly positive results. In this study, 96 smokers were used to assess the acute effects of pranayama on tobacco cravings. The pranayama technique used for this study is known as alternate nostril breathing [18]. It begins by inhaling through one nostril and out the other, alternating among the nostrils. Their desire to smoke was measured prior to the completion of a pranayama instructional training, immediately after the training, and 24 hours later. The participants reported a reduction in the urge to smoke, the strength of the urge and the length of time the urge persisted immediately following the training. However, there was little reduction of these urges 24 hours later, although adherence to the practice was low. Also, there was no reportable reduction in

the other withdrawal symptoms associated with tobacco cessation. This study provides some insight into the acute effect of pranayama, however, due to the lack of compliance through the duration of the study, stricter studies must be completed.

Another study attempted to test the effect of pranayama on opioid dependent users [19]. This study used male participants to assess changes in their quality of life with the implementation of SKY yogic breathing techniques. The study group, along with standard treatment, underwent 3 days of 12-hour SKY sessions. The control group received standard treatment only. Their quality of life was measured prior to treatment, 3 months, and 6 months after treatment. At the 6-month post treatment mark quality of life scores were significantly higher in the study group than in the control group. Another positive effect is that those in the study group indicated no drug use at 6 months post treatment as well. SKY yogic breathing has shown to be beneficial when used in conjunction with standard treatments for opioid addiction.

Dhyana as addiction treatment

Dhyana, or meditation, is at the center of many research studies involving addiction treatment. Meditation is the ancient art of focusing your attention on an image, sound or simply one's breathe [20]. This causes the meditator to lose focus of what may be ailing them, effectively reducing stress which has been known to be a major contributor to many health problems. Aside from reducing stress, it has been used in several therapeutic practices. It has been shown to enhance immune function in patients with cancer, AIDS, and autoimmune disorders. Some medical practitioners have begun to recommend meditation in conjunction with dietary and lifestyle changes for patients with hypertension or heart disease. It is easy to understand why this practice may translate to substance abuse disorder treatment as well.

According to research by Young, DeLorenzi and Cunningham [21] meditation should be used as a spiritual intervention in combination with traditional treatment programs. Meditation is categorized into three types: Devotional meditation (contemplation of prayer or biblical passage), mantra meditation (repetition of a word or phrase) and mindfulness meditation (focus of attention on the breath and present moment). They determined mindfulness meditation to be a key treatment for cravings often associated with addiction recovery. When a recovering addict practices mindfulness meditation they form a nonjudgmental awareness and acceptance of this craving, leading to an understanding of triggers and the ability to make alternate choices. Researchers recommend that due to its effects on cravings, it should only be used in the middle to latter stages of the recovery process.

Comparatively, a more recent study has shown promising results in the use of mindfulness meditation as treatment for addiction, specifically addressing emotional dysregulation. The study demonstrated that mindfulness meditation increases activity in the anterior cingulate cortex (ACC) and the adjacent prefrontal cortex (mPFC) thus improving an addict's ability to emotionally regulate [22]. The study measured the ACC and mPFC activity levels of both smokers and non-smokers. A Profile of Mood States (POMS) and a Positive and Negative Affect Schedule (PANAS) were used to measure emotional regulation. Subsequently, the participants were asked to complete two weeks of mindfulness meditation training. At the end of the training, both the smokers and non-smokers showed higher activity level in the ACC and mPFC areas of the brain as

well as higher emotional regulation. More significantly, 30% of the smokers had quit smoking and 60% of the smokers decreased use, and researchers believe these findings could be applied to research in other areas as substance abuse addictions are also associated with lower activity levels of the ACC.

Another study attempted to assess the treatment of cocaine addiction with integrative meditation [23]. Cocaine addiction continues to be a major public health problem with no current FDA-approved pharmaceutical therapy. This leaves suffering addicts with only psychosocial intervention options. This study attempted to test the efficacy of adding breathing-based integrative meditation to traditional outpatient treatment of cocaine addiction. The study followed 56 cocaine dependent patients as they were placed in either the control group (traditional outpatient treatment). The results showed that in the study group there were higher abstinence rates and significant reductions in cravings and anxiety. Future studies must be completed at a larger scale to confirm these results as results were self-reported.

One final study introduced Qigong meditation into a residential addiction treatment center [24]. Qigong meditation blends relaxation, breathing, guided imagery, inward attention, and mindfulness to illicit a tranquil state. This study included 248 participants who were asked to participate in nightly Qigong meditation sessions, but participation was not mandatory. They were given weekly questionnaires to assess their progress. There was a significantly higher treatment completion rate among those that chose to complete the additional Qigong meditation sessions. They also reported a greater reduction in cravings, withdrawal symptoms and anxiety. Though this study showed positive results there are quite a few limitations that leads researchers to require further studies to back these results.

Methods

This research was completed in the form of a systematic literature review. The following databases were scanned for peer-reviewed journal articles: PubMed, ProQuest and Science Direct. To gain background knowledge on the topic of yoga as treatment for addiction, the keywords, “yoga and addiction” were searched. Discovering there were different disciplines of yoga, more specific keywords were used such as “meditation and addiction,” “yogic breathing and addiction,” and “asanas and addiction.” As these are the more commonly used disciplines in current studies, it was necessary to narrow the research to these disciplines. To ensure the complete coverage of all articles that cite yoga as a treatment for drug addiction, the terms “yoga and addiction treatment” were searched. This led to a discovery of a myriad of studies that cite yoga as prevention for diseases. To gain further research in this area, the terms “yoga as prevention for diseases” and “yoga as prevention for addiction” were investigated. Requiring further knowledge about addiction and addiction treatment, “Addiction in the U.S.” and “Addiction treatment in the U.S.” was utilized. This led to an understanding that relapse was an important aspect of addiction recovery, therefore “addiction relapse” and “substance abuse and relapse” were searched. To better understand current treatment methods, the terms “current addiction treatment methods” were searched. This produced numerous articles citing exercise as treatment, which created a need for the search of the terms “exercise as addiction treatment”.

Inclusion criteria

To narrow the selection, they were filtered to include only peer-reviewed journal articles with information on yoga or exercise with

substance abuse/use treatment. The year of publication was also filtered so that only those journal articles that were written within the past 10 years were used, however, most used were within five years, however, exceptions were made for particularly significant articles (Table 1).

Quality assessment of articles

To ensure that only evidence-based articles were included in this review all articles that were narrowed down by the inclusion and exclusion criteria were then assessed for quality. Critical Appraisal Skills Program (CASP) tools were used to assess the quality of each paper included in the final review. Three separate reviewers scanned the articles. Two out of three reviewers were required to rate an article of high quality, though the CASP does not defined a specific “score” for quality, for the purposes of this analysis, the reviewers included paper that scored at least an 8/11 on the CASP tool that corresponded with the study design of each paper.

Results

There were (n=15) peer-reviewed journal articles identified for this systematic literature review. Each article reviewed the efficacy of the inclusion of yoga with traditional drug addiction treatment. The articles were organized by discipline of yoga used: Dhyana, Pranayama, Asana, and multidiscipline forms. Drug addictions such as dependence on alcohol, tobacco and illicit substances were treated. Most results showed positive correlations with the addition of yoga with traditional drug addiction treatment.

Discussion

Dhyana has shown in previous studies to enhance immune function and has been recommended by doctors for hypertension and heart disease. According to the literature review, there have also been positive results regarding drug addiction treatment. It was suggested that meditation be used in conjunction with traditional drug addiction treatment most notably when attempting to alleviate cravings. Mindfulness meditation helps to form nonjudgmental awareness and acceptance of the cravings which then gives the participants the ability to make alternate choices to deal with the craving.

According to the literature review, meditation has been revealed to have positive effects on emotional dysregulation. The anterior cingulate cortex (ACC) and the adjacent prefrontal cortex (mPFC) show increased activity during meditation. This leaves an addict with the ability to better regulate their emotions, which is key when attempting to quit a substance. More specifically, this study resulted in 30% of the tobacco smokers quitting and 60% decreasing their use. Another study showed promising results with meditation and cocaine addiction. Their study resulted in higher abstinence rates in the experimental group than those of the control group.

Finally, in the field of meditation as drug addiction treatment, the literature review showed that a special type of meditation, known as Qigong meditation, had positive results for participants. The study focused on the treatment of general drug addiction. This type of meditation resulted in participants reporting reductions in cravings, withdrawal symptoms and anxiety. Meditation has demonstrated a positive effect on the treatment of drug addiction.

While meditation displayed many positive results in the treatment of drug addiction, there were still several limitations to the studies

Table 1: Article summaries and results.

Title	Author (s), Year	Summary	Results/Significance
1. Practicing Meditation	Anonymous, 2002	<ul style="list-style-type: none"> This article discussed the principles of meditation It also explained for which illnesses meditation is currently a treatment 	<ul style="list-style-type: none"> Meditation has shown to enhance immune function in patients with cancer, AIDS and autoimmune disorders It has also been recommended for those patients with hypertension and heart disease It can enhance immune function in patients with cancer, AIDS and autoimmune disorders and has been seen to treat drug and alcohol addiction and PTSD. Pain, stress and anxiety disorders have been commonly treated with meditation
2. Adding integrative meditation with ear acupressure to outpatient treatment of cocaine addiction: A randomized controlled pilot study	Chen K, Berger C, Gandhi D, Weintraub E and Lejeuz C, 2013	<ul style="list-style-type: none"> This study intended to test the efficacy of meditation as treatment for cocaine addicted participants 	<ul style="list-style-type: none"> The results showed that in the study group there were higher abstinence rates and significant reductions in cravings and anxiety IMEA participants reported greater reduction in craving (p=0.03) and anxiety states (p=0.09) and greater increase in situational confidence (p<0.01) in drug temptation settings and more self-efficacy (p=0.06), than did control. However, there were no group differences in withdrawal significant symptoms, depression, or the Voris cocaine craving scale
3. Introducing qigong meditation into residential addiction treatment: A pilot study where gender makes a difference	Chen K, Comerford, A, Shinnick P and Ziedonis D, 2010	<ul style="list-style-type: none"> This study focused on Qigong meditation and its effects on addiction 	<ul style="list-style-type: none"> Results showed higher treatment completion rate among those that chose to complete the additional Qigong meditation sessions They also reported a greater reduction in cravings, withdrawal symptoms and anxiety When directly compared the SMART participants with those in the quality meditation group (N¼82), greater but not statistically significant improvement in the qigong group. Group differences did reach significant levels at week 2 for VAS craving (p<0.05), drug craving scale (p<0.01), anxiety (p<0.01) and depression (p<0.10.
4. Mindfulness meditation improves emotion regulation and reduces drug abuse	Tang Y, Tang R and Posner MI, 2016	<ul style="list-style-type: none"> This study attempted to discern which parts of the brain are affected by meditation in tobacco addicted participants 	<ul style="list-style-type: none"> Meditation resulted in increased activity in the anterior cingulate cortex (ACC) and the adjacent prefrontal cortex (mPFC) thus improving an addict's ability to emotionally regulate This resulted in 30% of the smokers quitting and 60% of the smokers decreasing their use Resting-state fMRI showed increased activity for the IBMT group in the ACC and mPFC, key brain areas for self-control and these areas were associated with a reduction in smoking behavior. results suggest that brief mindfulness meditation improves self-control capacity and reduces smoking even without a conscious intention to do so
5. Using meditation in addiction counseling	Young ME, DeLorenzi, LA and Cunningham L, 2011	<ul style="list-style-type: none"> This article explained the different types of meditation It also addressed how mindfulness meditation can help to mitigate cravings and ease triggers 	<ul style="list-style-type: none"> Mindfulness was determined mindfulness meditation to be key in the treatment of cravings Mindfulness meditation disrupts addiction cycle by ushering in curative mechanisms in the form of nonjudgmental, nonreactive awareness and acceptance of the craving response, thus acting as a form of counterconditioning that can serve as an alternative to addiction.
6. Between inhale and exhale	Dai C and Sharma M, 2014	<ul style="list-style-type: none"> This article relays information on previous studies regarding yogic breathing and its effects on tobacco cessation 	<ul style="list-style-type: none"> Rhythmic breathing proved to be easy, cost-effective and encouraged a relaxed state Although another survey found that only 50% respondents perceived yoga as a way to manage or treat health conditions, 73% reported that one of the main reasons for taking yoga is stress management.²⁴ Yoga combining a practice of movement, breathing, or relaxation has been linked to improved positive mood.²⁵ It seems yoga could be promoted as a way to manage anxiety among smokers since most smokers have used smoking as a strategy to reduce their anxiety.

<p>7. Effectiveness of yogic breathing intervention on quality of life of opioid dependent users</p>	<p>Dhawan, Chopra, Jain, Yadav and Vedamurthachar, 2015</p>	<ul style="list-style-type: none"> This was a study that looked at the effects yogic breathing had in respects to treatment of opioid addicted participants It followed the Sudarshan kriya yoga (SKY) method of yogic breathing 	<ul style="list-style-type: none"> Post treatment, quality of life scores were significantly higher in the study group than in the control group Those in the study group indicated no drug use at 6 months post treatment as well The GEE model results showed that between the two groups over time (study vs. control) the scores of physical ($P<0.05$); psychological ($P<0.001$) and environment domain ($P<0.001$) were higher in the study group indicating a better QOL.
<p>8. The acute effects of yogic breathing exercises on craving and withdrawal symptoms in abstaining smokers</p>	<p>Shahab L, Sarkar BK and West R, 2012</p>	<ul style="list-style-type: none"> The article examined yogic breathing and its effects on tobacco cravings 	<ul style="list-style-type: none"> Participants reported a reduction in the urge to smoke, the strength of the urge and the length of time the urge persisted immediately following the training There was little reduction of these urges 24 hours later Immediately after watching or practicing yogic breathing exercises, the majority of participants thought that yogic breathing was 'probably' or 'definitely' helpful for smokers wanting to stop smoking (70.8%, 95% CI 61.7–79.9) and that they would 'probably' or 'definitely' use it in a future quit attempt (72.9%, 95% CI 64.0–81.8). There were no differences by group (Fig. 2). At 24-h follow-up, a higher proportion of participants in YBG rated yogic breathing exercises to have been 'very much' or 'extremely' useful (47.9%, 95% CI 33.8–62.0) than participants in the VCG group appraised concentrating on breathing to be (18.8%, 95% CI 7.7–29.8; $\chi^2(1)09.2$, $p00.002$).
<p>9. Sudarshan kriya yoga: Breathing for health</p>	<p>Zope SA. and Zope RA, 2013</p>	<ul style="list-style-type: none"> This article focuses on Sudarshan kriya yoga (SKY) method of yogic breathing It follows participants who suffer from tobacco dependence and participants who suffer from alcohol dependence 	<ul style="list-style-type: none"> The SKY technique reduced tobacco habits of 21% of participants over a six-month period 60 patients seeking treatment for alcohol dependence that participated in SKY for two weeks resulted in the patients experiencing anti-depressant effects In a study of cancer patients who had completed their standard therapy, researchers have shown that SKY helped to control the tobacco habit in 21% of individuals who were followed up to 6 months of practice. SKY was tested for antidepressant effect in 60 inpatients of alcohol dependence. Subjects completed the Beck Depression Inventory (BDI) before and after the 2 weeks of this intervention. Morning plasma cortisol, ACTH and prolactin too were measured before and at the end of 2 weeks.
<p>10. Yoga in the treatment of addictions. The two-year experience of yoga practice with patients of the Takiwasi/yoga practice rehabilitation center in the treatment of addictions. The experience of two years of yoga practice with inpatients of Takiwasi rehabilitation center</p>	<p>Brito C, 2010</p>	<ul style="list-style-type: none"> This study incorporated the yoga disciplines to help treat poly-drug users at the Takiwasi Rehabilitation center This study followed 23 patients for 4.5 months of treatment 	<ul style="list-style-type: none"> All patients reported physical and psychological benefits due to their yoga practice The regular practice of Yoga decreases automatisms, impulsive behavior and the tendency to go to the extremes of the patient with problems of addiction, gradually incorporating awareness and moderation in their actions and increasing the patient's ability to be present, to accept himself and Tolerate frustration.
<p>11. Yoga and mental health services</p>	<p>Gangadhar B and Porandla K, 2015</p>	<ul style="list-style-type: none"> This article focused on yoga in the treatment of depression specifically associated with alcohol withdrawal It looks at which mechanisms in the brain may be triggered by the practice of yoga 	<ul style="list-style-type: none"> Both cortisol levels and brain-derived neurotrophic factor (BDNF) levels are reduced, producing antidepressant effects Acute Asana practice sessions can elevate GABA levels which are key to mood stabilization Research shows Dhyana to have positive effects on neuroplasticity Yoga also reduced cortisol levels in alcohol dependent subjects undergoing detoxification as well as in patients with depression disorder. [12,20] In depressed patients who as a group had lower levels of a brain-derived Neurotrophic factor (BDNF), yoga therapy increased the levels of BDNF in serum.

<p>12. Yoga as an adjunct treatment for alcohol dependence: A pilot study</p>	<p>Hallgren M, Romberg K, Bakshi A and Andréasson S, 2014</p>	<ul style="list-style-type: none"> This study focused on the Asana discipline of yoga It followed 18 alcohol dependent participants as they were encouraged to practice yoga on a daily basis for 10 weeks 	<ul style="list-style-type: none"> The results found that there was a greater reduction in the consumption of alcohol in the group that received traditional treatment and yoga than the group that received the traditional treatment alone
<p>13. Reducing addictions via the self-soothing effects of yoga</p>	<p>Kissen M and Kissen-Kohn D, 2009</p>	<ul style="list-style-type: none"> This article investigates how the self-soothing effects of yoga help the treatment of addiction 	<ul style="list-style-type: none"> Practicing yoga patients begin to feel relaxed as well as gain control of motor and sensory aspects of the body This will leave the patient with the knowledge that they have control of their physical bodies and mental states However, morning cortisol levels (nmol/L) were lower in the TAUplus yoga group (mean=27.6, SD=11.5) compared to TAUonly (mean=31.7, SD=12.0). All participants interviewed were positive toward the yoga intervention, stating that the program had improved their sense of wellbeing and had made them feel more relaxed and less anxious.
<p>14. Evaluation of a Residential Kundalini Yoga Lifestyle Pilot Program for Addiction in India</p>	<p>Khalsa S, Khalsa G, Khalsa H and Khalsa M, 2008</p>	<ul style="list-style-type: none"> This article explores the effects a Kundalini yoga lifestyle has on those afflicted with drug addiction 	<ul style="list-style-type: none"> Participants showed improvements on several psychological self-reported questionnaires including the Behavior and Symptom Identification Scale and the Quality of Recovery Index Areas include impulsive and addictive behavior, daily living and role functioning, depression and anxiety and relation to self and others Average scores on the QRI for the total score and for all of the subscales showed clear declines from the baseline to the follow-up evaluations. RMANOVAs on the total score and scores for the Active Recovery and Work-School Performance subscales showed significant main effects for time, $p < 0.05$ and the post hoc tests showed statistically significant improvements between the baseline and follow-up measures
<p>15. A narrative review of yoga and mindfulness as complementary therapies for addiction</p>	<p>Khanna S and Greeson JM, 2013</p>	<ul style="list-style-type: none"> This article examines the mindfulness effect that yoga has and how it plays a role in the treatment of drug addiction 	<ul style="list-style-type: none"> With the practice of Asanas, Dhyana and Pranayama, a patient will steady their focus, strengthen concentration, reinforce emotional regulation and enable self-observation A pilot RCT of 37 alcohol dependent adults from a residential therapeutic community who completed the MORE program found that, compared to an evidence-based support group, MORE produced a number of superior outcomes, including reduced stress and thought suppression, increased physiological recovery from alcohol cues indexed by heart rate variability during a laboratory task and decreased alcohol attentional bias.

that lead to the supposition that there needs to be further research in this area of study. First, it must be stated that meditation is not an exact art. There are many forms of meditation that necessitates a better understanding of how the participants are completing their meditation. Also, many of these studies required the patients to both self-report their results and self-report their completion of program. This can lead to a bias in the results. Many of these studies were completed on a smaller scale; therefore it is necessary to complete these studies on a larger scale to see if the results can lead to generalizability.

Pranayama is a discipline of yoga that has shown to balance the autonomic nervous system to help influence psychological disorders such as addiction (Table 2). In one study it was shown to reduce the tobacco habits of 21% of the participants over a 6-month period. In another study, SKY demonstrated to have anti-depressant effects in alcohol dependent participants. Finally, using the SKY method for opioid addiction, the addicted participants showed to have higher quality of life scores in the experimental group than those of the

control group.

Several studies attempted to examine the effects of yogic breathing on addiction in tobacco users. This study found several benefits to yogic breathing, most notably, its ease of use, cost-effectiveness, and encouragement of a relaxed state. Another study resulted in users reporting a reduction in the urge to smoke, the strength of the urge, and the length of time the urge persisted immediately following the training of yogic breathing. As with Dhyana, yogic breathing can help in the treatment of drug addiction.

However, there are also limitations to the studies provided in the area of Pranayama. Some studies showed a lack of adherence to the practice. This lack of adherence leads to bias and inaccurate results. Stricter studies must be completed to expose the true accounts of yogic breathing as treatment of drug addiction. As with Dhyana, there are myriad of forms of yogic breathing. More studies are

Table 2: Articles by treatment discipline and disease treated.

Title	Discipline	Disease treated
1. Practicing Meditation	Dhyana	Stress, Autoimmune Diseases, Cancer, AIDS, hypertension, heart disease
2. Adding integrative meditation with ear acupressure to outpatient treatment of cocaine addiction: A randomized controlled pilot study	Dhyana	Cocaine addiction
3. Introducing qigong meditation into residential addiction treatment: A pilot study where gender makes a difference	Dhyana	General drug addiction
4. Mindfulness meditation improves emotion regulation and reduces drug abuse	Dhyana	Tobacco addiction
5. Using meditation in addiction counseling	Dhyana	General drug addiction
6. Between inhale and exhale	Pranayama	Tobacco addiction
7. Effectiveness of yogic breathing intervention on quality of life of opioid dependent users	Pranayama	Opioid addiction
8. The acute effects of yogic breathing exercises on craving and withdrawal symptoms in abstaining smokers	Pranayama	Tobacco addiction
9. Sudarshan kriya yoga: Breathing for health	Pranayama	Tobacco addiction/Alcohol addiction
10. Yoga in the treatment of addictions. The two-year experience of yoga practice with patients of the Takiwasi/yoga practice rehabilitation center in the treatment of addictions. The experience of two years of yoga practice with inpatients of Takiwasi rehabilitation center	Multidiscipline	General drug addiction
11. Yoga and mental health services	Multidiscipline	Alcohol addiction
12. Yoga as an adjunct treatment for alcohol dependence: A pilot study	Asana	Alcohol addiction
13. Reducing addictions via the self-soothing effects of yoga	Multidiscipline	General drug addiction
14. Evaluation of a Residential Kundalini Yoga Lifestyle Pilot Program for Addiction in India	Multidiscipline	General drug addiction
15. A narrative review of yoga and mindfulness as complementary therapies for addiction	Multidiscipline	General drug addiction

needed to further understand which forms work best in treatment of addiction.

According to the literature review, Asana practice has also shown to have positive effects in the treatment of drug addiction. This research focused specifically on the treatment of alcohol addiction. After ten weeks of weekly group yoga sessions, results exposed a greater reduction in the consumption of alcohol in the experimental group than with the control group. This lead the researchers to the conclusion that Asana has positive benefits in the treatment of drug addiction when used in conjunction with traditional treatment.

There were limitations in this study as well. This study suggested that participants practice yoga more often than the weekly group yoga sessions. However, it is unclear how often the participants participated in this self-guided yoga and how that figured into the results of the study. This study was also completed amongst a small group of participants. Further research must be completed to assess if it has the possibility to be generalized. Lastly, this study failed to assess the participants in the long term, so it is unclear how many participants succumb to relapse. Several studies did not emphasize one discipline of yoga, but instead incorporated all or some of the disciplines researched in this review. In one study which incorporated all three disciplines, they were required to practice two times per week for a total of 4.5 months. Once completed, the participants reported physical and psychological benefits. Another study incorporated the Kundalini Yoga lifestyle into the treatment of drug addiction. Results showed improvements according to psychological questionnaires that were administered. Areas of improvement included impulsive and addictive behavior, daily living and role functioning, depression and anxiety, and relation to self and others.

Further studies helped to explain which physiological mechanisms are at work when practicing yoga. Both cortisol levels and brain-derived neurotrophic factor (BDNF) levels are reduced, causing antidepressant effects. Asana practice sessions can elevate

GABA levels which are key to mood stabilization and research shows Dhyana to have positive effects on neuroplasticity. Another study attributed the physiological effects of self-soothing to yoga’s resulted benefit in the treatment of drug addiction. Specifically, breath work and physical posturing leave the patient with the knowledge that they have control of their physical bodies and mental states. Research has also shown the act of yoga will give the participant a feeling of safety and stability.

Another study suggested it was the mindfulness created when practicing yoga that helps with the treatment of drug addiction. When a participant practices yoga, they are able to steady their focus, strengthen concentration, reinforce emotional regulation and enable self-observation. As seen in the research, when one incorporates several disciplines of yoga in the treatment of drug addiction, results are positive. The yoga studies that encompassed more than one discipline too suffered from limitations. One study lacked a control group. Without a control group the results are biased. Many of these studies were also completed with a small sample size which necessitates further research to accept the results. Also, because these studies do not focus their research on a particular discipline, the variety of combinations of the disciplines can create myriad of treatment plans. This leads to a lack of understanding as to which mechanisms are at work in these treatment plans.

Conclusion

Addiction has become an international crisis of which the people in the United States are not immune. Many people are seeking the help of treatment programs, however, the majorities relapse shortly after the completion of the program. Therefore, there is a need for modifications or additions to current treatment methods to increase effectiveness. Yoga improves the health of the practitioner physically, mentally and spiritually. The positive effects of yoga have been researched for the treatment of drug addiction. Dhyana, Pranayama, Asana, as well as the multidiscipline approach have shown to have

positive effects in the treatment of drug addiction. Due to the limitations of these studies, however, further research is needed to confirm these results.

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