



Original Article

Effect of Resistance Training and Mindfulness on Erectile Dysfunction in Addicts Who Were Quitting Addiction

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ABSTRACT

Background: Addiction is one of the greatest problems of human societies, which not only causes social and behavioral disorders but also affects different aspects of health and imposes huge financial loss on individuals, families, and society. The purpose of this study was to determine the effect of resistance training and mindfulness on the sexual function of addicted people.

Methods: The present study is an experimental research conducted using a pretest-posttest design with a control group. Participants of this study consisted of 50 married men aged 30-45; since their referral to addiction treatment centers in Shahrekord two weeks had passed. They were selected using convenience sampling method and matched based on the age range and history of addiction and divided into four groups of resistance training, mindfulness, combined (resistance training and mindfulness), and control. The resistance and combined training groups participated in resistance training for 8 weeks. The mindfulness and combined training groups participated in mindfulness therapy training for 8 weeks. During this period, the control group performed their daily activities. Before and after the intervention, data were collected using an erectile dysfunction questionnaire. Data were analyzed using covariance.

Results: All three types of intervention, including resistance training ($P \leq 0.001$), mindfulness training ($P \leq 0.006$), and combined training ($P \leq 0.001$), lead to the improvement of sexual performance. Additionally, combined training was more effective compared to the other two methods ($P \leq 0.001$).

Conclusion: In order to improve the sexual performance of addicts, physical exercise and mindfulness training can be used. The simultaneous use of both methods has a greater influence on the improvement of sexual performance due to the addicts benefitting from the effects of two types of intervention.

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Introduction

Throughout history, and in all cultures and nations, humans have tended toward changing their psychological and mental states; and for this purpose, they have used narcotics and psychotropic substances [1]. Narcotics include opioids such as morphine, which are used

repeatedly for pleasure and pain relief [2]. The use of opioids leads to the introduction of adaptive mechanisms in the central nervous system, which in turn lead to short-term and long-term changes in the function of morphine-sensitive neurons. Tolerance and dependence (addiction) are among the consequences of these changes [3]. Addiction is one of the major problems in developing family [4]. These statistics indicate that millions of lives *have been devastated and destroyed* and a large amount of national capital has been spent to combat *drug* abuse or compensate for injuries caused by it. [5].

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Undoubtedly, one of the greatest detrimental consequences of opiate and alcohol abuse is family problems. According to conducted studies, researchers believe that many drug addicts die due to the direct or indirect effects of drugs. This can bring their families to the brink of disaster. [6]. Moreover, addiction can affect the future career of the person. Studies show that people's attitudes toward addicts are negative to such an extent that they are reluctant to hire the drug abusers; as a result, their families face poverty [7]. Another dangerous problem which can result from addiction is the increased rate of AIDS. Sharing *needles* for injecting drugs is the main cause of HIV infection [8]. Divorce is another major consequence of addiction [9]. One of the causes of divorce among addicted people is sexual dysfunction [10].

With regard to the problems and complications caused by substance abuse for the individual, family, and society, researchers have used a variety of methods to treat addicts. Among these methods are medical methods such as pharmacotherapy, methadone therapy, and acupuncture treatment which can be used to reduce physical dependence. Moreover, psychological interventions such as mindfulness [11] have been used to control the components.

Of the various methods, methadone therapy is used as one of the main techniques for quitting addiction. However, researchers consider sexual dysfunction as one of the most common side effects of methadone therapy. Sexual dysfunction, such as erectile dysfunction, disorders related to ejaculation, and the lack of sexual desire are often reported in a large number of male methadone-treated patients [12]. Considering the negative effects researchers have found after methadone treatment and medication, the importance of using complementary therapies such as physical activities [13] and cognitive-behavioral interventions are highlighted.

Physical activity and exercise have many physical and mental advantages. Exercise will improve cardiovascular health [14], decrease anxiety and depression, boost mood [15], improve sleep quality, and control aggression [13]. Among the different exercises, resistance training has a greater influence on sexual hormones compared to other types of training [16]. Another intervention that may affect the physical and mental health of people who are quitting addiction is mindfulness interventions.

Mindfulness is special purposive attention to the present time, without judgment and prejudice. It helps people avoid thinking about the past and future events, and experience just being in the present moment [17].

In the past decade, mindfulness-based interventions have been studied as a treatment for a variety of addictive behaviors, including drinking, smoking, opioid misuse, and use of illicit substances like cocaine and heroin [18].

These studies indicated that mindfulness increases

emotional self-regulation and may be beneficial in the prevention of a relapse. [19].

Also, recent literature supports the benefits of mindfulness for the treatment of female [20] and male sexual dysfunction [21].

Although several studies showed promising results of the efficacy of physical activity [22] and mindfulness for sexual function, research studies in this area are new and restricted to samples with some specific diseases. It is important to assess intervention acceptability because successful implementation depends on participant acceptability [23]. Therefore, the purpose of the present study was to determine the effect of resistance training and mindfulness on the erectile function of men who were quitting addiction.

Methods

The present study is an experimental research conducted using a pretest-posttest design with a control group. Participants of this study consisted of 50 married men aged 30-45 years who were quitting addiction. The statistical sample was selected out of addicted men who had referred to the addiction centers of Shahrekord two weeks ago and satisfied the inclusion criteria. The criteria included: 1. they have lived with their spouses over the past year; 2. Two weeks have passed since they quit addiction; 3. they have mild to moderate erectile dysfunction according to the International Index of Erectile Function Questionnaire, and obtained a score between 12 to 16. Men with active physical illness (cardiovascular disease, diabetes, etc.) and disabilities were excluded from the study. Research ethics certificate for this study was obtained from Research and Ethics Committee of Islamic Azad University. Written informed consent was obtained from all participants.

Before the intervention, a resistance training program was held to familiarize participants of the resistance and combined training groups with the given motions, the duration, and the implementation of training program. The training period included 8 weeks of resistance training. Each week there were 3 sessions and each session lasted 50 to 60 minutes.

At the beginning of the session, about a 10-minute warm up, a 40-minute resistance training (a combination of leg, hand, chest, abdominal, and back muscle motions) and pelvic floor exercises, and finally, about a 10-minute cool down were performed (Table 1). The exercises were presented by the fitness instructor.

Mindfulness and the training group also participated in mindfulness therapy training course for eight 90-minute sessions (one session per week) (Table 2) [24]. Mindfulness training was presented by a psychologist.

The questionnaire was completed by the participants

Table 1: Protocols of Selected Resistant Exercises

Selected resistance training	Training stages	Time (min)
Stretching and rotational motions of the joint	Warm up	15
Exercises for back, chest, hands, abdomen, legs and pelvic floor muscles	Resistance training	30
Stretching exercises	Cool down	15

Table 2: Protocol of mindfulness practice (adopted from [24])

Session	In-Session Meditation	Sexuality Education and Exercises	Home Practice (Length/day)
1 and 2	Raisin exercise	Physiology and pathophysiology of erectile functioning Impact of "goal-oriented" sex Rationale for mindfulness and ED Sexual response model Informal mindfulness practice	Mindful breathing (20 minutes) Informal mindfulness practice (5minutes)
3 and 4	Body scan	Review of home practice 5 part cognitive model Dealing with thoughts in mindfulness	Body scan (20 minutes) Informal Mindfulness practice (5 minutes)
5 and 6	Breath and movement	Review of home practice Thinking traps Non-goal directed sex Pie chart exercise exploring important elements of "enjoyable" sex Introduction to sensate focus	Exercise of their choice (body scan, mindful breathing, or mindful movement) (20 minutes) Informal mindfulness practice (5 minutes)
7 and 8	Breath, body, sounds, and thoughts 3-minute breathing space	Review of home practice Maintaining practice beyond the group and trouble-shooting techniques for long-term practice Check out and solicitation of feedback about the group	Continuing regular practice of their choice (20 minutes) Continuing informal mindfulness practice (5 minutes)

before and after the training program to assess changes in variables. In this study, the International Index of Erectile Function (IIEF) for men was used. This questionnaire is one of the appropriate tools for the international evaluation of erectile function. It is a 15-item questionnaire that assesses the erectile function in men in 5 areas: erectile function (items: 1- 5, 15), orgasm function (items: 9, 10), sexual desire (items: 11, 12), intercourse satisfaction (items: 6 - 8), and full satisfaction (items: 13, 14). According to the score the individual obtained from the questionnaire, the severity of sexual dysfunction is divided into 5 categories: severe (score 5 to 7), moderate (score 8 to 11), mild to moderate (score 12 to 16), mild (score 17 to 21), and normal (score 22 to 25). Intercultural validation and generalizability of IIEF was demonstrated in Iran with satisfactory psychometric properties [15].

The data were analyzed using SPSS software version 23 at descriptive (mean and standard deviation of scores) and inferential level (covariance analysis).

Results

Descriptive data are summarized in Table 3.

Findings of Table 4 show a significant difference between groups ($F=64.08$, $P<0.001$). Therefore, the effect of resistance, mindfulness, and combined training (resistance training and mindfulness) on sexual performance is different.

Paired comparisons were used to determine the differences in sexual function between groups. The results of Tukey's test indicated that the sexual function in combined training has been greater than the other methods (Table 5).

Discussion

The first finding of this study showed that physical activity improves the symptoms of erectile dysfunction. These findings are in agreement with those obtained by studies conducted on the effect of physical activity

Table 3: Descriptive data of sexual function

Variable	Type of variable independent	Mean±SD	
		Pre-test	Post-test
Sexual function	Combined	13.21±1.13	21.82±1.31
	Resistance	13.86±0.63	18.05±2.05
	Mindfulness	13.21±1.68	15.35±1.49
	Control	13.32±0.82	12.90±0.87

Table 4: Covariance analysis of sexual function scores

Source	Sum of squares	Degrees of freedom	Average squared	F	P	Eta	Statistical power
Pre-test	1.07	1	1.07	1.07	0.49	0.013	0.103
Group	436.83	3	145.61	64.08	0.001	0.846	1
Error	79.52	35	2.27	-	-	-	-
Total	518.01	9	-	-	-	-	-

Table 5: Paired comparison of the sexual function scores

	Comparison of groups	Average difference	Standard error	Significance level
Combined	Resistance	3.89	0.68	0.001
Combined	Mindfulness	6.50	0.67	0.001
Combined	Control	8.91	0.67	0.001
Resistance	Mindfulness	2.61	0.68	0.003
Resistance	Control	5.02	0.69	0.001
Mindfulness	Control	2.41	0.64	0.006

on the improvement of sexual function in patients with cardiovascular disease [25], prostatectomy, and cancer [26], and pointed to the positive effect of physical exercise on sexual function. Additionally, this finding is *in accordance with* that of the review study conducted by Silva et al. [22]. In their study conducted on 7 research studies, they concluded that physical activity reduces erectile dysfunction. As sexual dysfunctions are related to hormonal imbalance, vascular and neurological disorder [27], as well as psychological problems [28], it seems that different physiological, physical, and psychological mechanisms can contribute to the improvement of erectile function following physical exercise. Physiologically, improving the strength of pelvic floor muscles, effective muscle contraction, and proper blood circulation can improve erectile function. The *reduction of oxidative stress* following sports exercises leads to availability of nitric oxide within the *penile* vessels [28], which is related to the erection function.

Several studies have shown that the level of testosterone in men who regularly use drugs is stopped regardless of the type of drug [29]. Based on research evidence, physical activity can increase the amount of hormone-binding globulin in plasma. The results obtained from studies have shown that physical activity significantly increases the testosterone level in people [30]. In addition, since one of the causes of erectile dysfunction is a reduction in the testosterone level, physical activity seems to increase the plasma testosterone level and improves the sexual performance of addicts. In explaining the mechanism of the effect of testosterone secretion after exercise, one can refer to the increased level of lactate after exercise, as well as its stimulating effect on gonadal secretion followed by an increase in the release of the luteinizing hormone from the anterior pituitary that increases testosterone secretion [31]. Some studies have also indicated a change in the ratio of testosterone to cortisol during resistance training. They have acknowledged that this ratio has a systemic relationship with sexual function [32].

Another effect of physical activity is its effect on neurotransmitters, such as adrenaline, noradrenaline and dopamine. These neurotransmitters affect one's mood. Based on research evidence, mood affects sexual function [33] and, possibly by boosting one's mood, sexual performance improves.

Moreover, by doing physical activity, people will appear to have a more positive body image. Some studies have demonstrated that resistance training improves body self-esteem by improving body composition (body muscle mass, fat in the arm, legs, and the whole body) [34]. Another possible reason is the effect of physical activity on sexual function, increased physical fitness, and cardiovascular fitness following physical exercises.

Another finding of this study showed that mindfulness training has a positive effect on sexual function. This finding is in agreement with those of the studies that indicated the positive effects of mindfulness training on sexual function in women with low sexual desire and female orgasm [35]. In explaining this finding, it can

be acknowledged that mindfulness training can have an impact on mood [36] and improve sexual function. Various sexual problems have common psychological factors, including anxiety and depression [37]. Possibly by reducing anxiety and depression, sexual function improves. Sexual dysfunction is often associated with negative cognition [38]. Negative cognition leads to lack of sensory concentration in the person during a sexual relationship and produces cognitive distraction [39]. This is why understanding emotions and physical and verbal stimuli pave the way for a good sexual relationship.

It seems that the mindfulness guidelines such as allowing thoughts to improve, and reviewing all experiences instantaneously without mental judgments increase sensory concentration. In particular, in one of the mindfulness exercises, people learn to live in the present moment. This can be considered as a sensory tool and an analogy to increase attention, which is one of the mindfulness exercises. Focused and non-judgmental attention may shift capacities from negative to neutral or even positively affect them. It seems that mindfulness improves sexual function by increasing attention, non-judgmental awareness, and self-esteem.

The last finding of this research showed that the combined training had a greater influence on erectile dysfunction. The effect of mindfulness and resistance exercise on erectile dysfunction has already been explained. Both types of intervention improved this disorder. Therefore, most probably, performing these two types of training has allowed participants to take advantage of both interventions.

Conclusion

Overall, the findings of this study showed that resistance training and mindfulness improve sexual function. Considering that the present study is among the first studies on the effect of resistance training and mindfulness on erectile dysfunction in men who were quitting addiction, it is necessary to investigate the effect of resistance training and mindfulness on erectile dysfunction by controlling the type of consumed drug and the history of drug consumption in future studies to gain a deeper insight. Additionally, the *sex partner's behavior* affects sexual performance, but due to the limitations related to the sample this factor was not controlled. It is suggested that the *effect of the sex partner's behavior on sexual function* is investigated in future studies.

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