

## REVIEW

# Acupuncture for Obesity

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### Abstract

In this review study, we aimed to show the effects of acupuncture on obesity in light of recent studies. Obesity is a significant health problem that is accepted as a risk factor for many diseases, such as diabetes, hypertension, hyperlipidemia, cardiovascular disease, and fatty liver and has become an epidemic worldwide. Acupuncture is a form of treatment applied by inserting needles into specific points on the body for therapeutic purposes. There are still uncertainties about whether acupuncture practices alone are effective in treating obesity. In addition, there is evidence that it stimulates some anorexigenic hormones, inhibits some orexigenic hormones, and, as a result, suppresses appetite. It has been reported in the literature that these effects of acupuncture are much more effective when applied together with diet and exercise. Acupuncture reduces the appetite of obese patients, increases their compliance with diet and exercise, and reduces the anxiety caused by hypocaloric nutrition with the anxiolysis effect it creates. It also accelerates metabolism by providing homeostasis in the body and enables patients to lose weight. In these multidisciplinary treatment approaches, it would be very beneficial to include acupuncture treatment, one of the complementary and alternative treatment methods for treating obesity.

**Keywords:** Acupuncture, Obesity, Treatment.

### INTRODUCTION

Obesity is a significant health problem that is accepted as a risk factor for many diseases, such as diabetes, hypertension, hyperlipidemia, cardiovascular disease, and fatty liver and has become an epidemic worldwide.<sup>1</sup> According to the data of the World Health Organization, there are 1.9 billion overweight and 650 million obese individuals worldwide. Again, 41 million children under 5 are overweight or obese.<sup>2</sup>

Obesity is not just a health problem caused by the problem of self-control. It occurs due to excessive accumulation of body fat, which is caused by many factors (genetic predisposition, environmental factors, individual behavior) based on obesity and is mainly caused by problems in energy metabolism and appetite regulation.<sup>3,4</sup> There are many different methods used in the treatment of obesity. These treatment methods are applied individually or as a combination treatment. These; can be listed as diet therapy tailored to the individual, providing adequate physical activity, necessary psychological support, appropriate behavioral therapy, pharmacotherapy, complementary/alternative treatments, and bariatric surgery treatment if

necessary. The first step in treating obesity is to make the proper lifestyle change. The next step is to question whether the person sleeps enough and report that at least 7 hours of sleep will positively affect weight loss by calculating the amount of water the person should take daily. In addition, acupuncture, one of the oldest treatment methods of Traditional Chinese Medicine, has a significant place in treating obesity. One of the mechanisms of action of acupuncture is; the effects of endogenous opioid peptides. It is known that acupuncture has analgesic effects. After acupuncture application, beta-endorphin (BE), one of the endogenous opioids, rises in the plasma and affects the metabolism. It is known that beta-endorphin, one of the endogenous opioids rising in the plasma with abdominal and ear acupuncture application, affects lipid metabolism by increasing lipase activation and causing lipoproteinemia.<sup>5,6</sup> It is known that acupuncture applied to specific points causes weight loss by controlling the feeling of hunger.<sup>7,8</sup>

### History of Acupuncture

Acupuncture is a form of treatment applied by inserting needles into specific points on the body for

therapeutic purposes. Consists of two Latin words (acus, needle, puncture, prick).<sup>9</sup> Acupuncture is one of the methods of complementary and alternative medicine that originated in ancient Chinese medicine. Known as the life energy, Qi circulates in the meridians in the body. Acupuncture is a treatment method based on stimulating some special points in the ear or body to regulate this energy excess or deficiency in diseases. The National Center for Complementary and Alternative Medicine (NCCAM), affiliated with the United States National Institute of Health (NIH), was established in 1998 to investigate the safety and effectiveness of acupuncture practices in the world and to ensure the participation of practices in treatments for diseases whose effectiveness is accepted.<sup>10</sup>

According to Traditional Chinese Medicine, the body's Yin and Yang is the delicate balance of two opposing and inseparable forces that explain the workings of the entire universe. According to this theory, the yin and yang poles are never fixed. Therefore, they are not absolute. On the contrary, they are constantly changing and transforming. Opposites always exist together. No situation does not have an opposite pole. Examples of poles are night and day, light and dark, cold and warm, inside and outside, near and far, short and long. In the darkest hour of the night, the day begins. In most mania state, depression is expected to be triggered. The poles are always in a mutually producing-consuming or supporting-restricting relationship. Poles can consume and constrain each other in the same way they produce support. If yin is increasing in the body, it will harm yang; if yang is increasing, it will harm yin. A yang-influenced disease at the beginning can turn into a yin-influenced disease; A yin-effect disease can also have a yang-effective course. In Chinese Medicine, the yin or yang nature of the diseases is an essential factor in determining the treatment strategy.<sup>11,12</sup>

According to Traditional Chinese Medicine, health is achieved when the body is balanced. The disease occurs due to the internal imbalance of Yin and Yang. This imbalance causes Qi (Vital Energy) to be blocked in pathways known as meridians. According to Traditional Chinese Medicine, the blockage in Qi can be opened by applying acupuncture to specific points associated with the meridians. Many sources define meridians as 14 main channels formed by networking of at least 2000 acupuncture points.<sup>13,14</sup>

It is claimed that the primitive practices of

acupuncture in Chinese history date back to much earlier than written periods. It is known that sharp-edged stones called bian were used long before needles. Over time, needles made of bone or bamboo began to be used instead of Bian stones. When the bronze casting technique was developed, the use of bronze needles emerged, and the use of metal needles gained importance. Dabry (1853) and Morant (1927) first introduced acupuncture to the West. The first European countries to use acupuncture are France and Germany. The electro-acupuncture technique, which is based on the stimulation of acupuncture points with electrical instruments, was developed in France in 1825.<sup>14</sup>

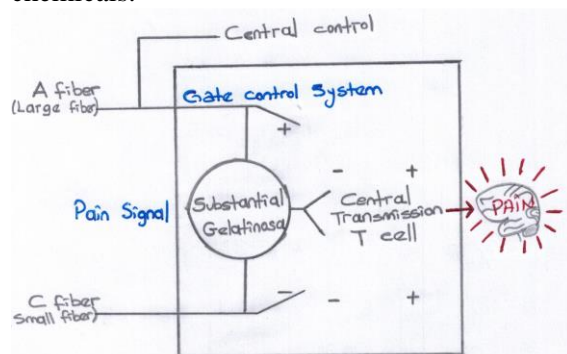
### **Effect Mechanisms of Acupuncture**

1965 Melzack and Wall introduced the door control theory (Figure 1). According to this theory, small-diameter nerve fibers carry the pain impulse through a gate mechanism. In contrast, large diameter fibers pass through the same gate to inhibit the signal carried by the smaller ones. Depending on whether the door is open or closed, the brain releases various neurochemicals in response to the pain stimulation it receives. For this reason, pain signals can be prevented by stimulating the periphery of the pain area to stimulate the relevant areas in the brain stem or cerebral cortex, or the nerves in the muscle.<sup>13</sup> The neural plate theory, on the other hand, is a slightly more advanced version of the gate control theory, which includes the effects of opioids. Opioids are a group of endogenous chemicals that bind to opioid receptors and inhibit nerve activity and pain transmission in the substantia gelatinosa part of the spinal cord. Stimulation of peripheral nerves in the muscles sends impulses to the central nervous system and stimulates the release of endorphins from the hypothalamic-pituitary axis. It is thought that due to the increase in endorphins in the cerebrospinal fluid, endorphins increase in the neuromuscular junction or nerve endings and affect the sense of pain with the analgesic effect.<sup>15</sup>

An opiate antagonist of endorphins, naloxane has been used to demonstrate the analgesic effect of acupuncture. It has been shown that administration of naloxane before acupuncture destroys the effect of acupuncture.<sup>15</sup> The present invention demonstrates that the effects of endorphins are through opiate receptors.

The release of beta endorphins, a type of endorphin, is associated with the release of ACTH. ACTH releases cortisol from the adrenal cortex. Some of the anti-inflammatory effect of acupuncture may be related to cortisol. ACTH and cortisol are important

in substance abuse and substance withdrawal. ACTH and cortisol levels are high in abstinence in substance addicts. Acupuncture may be effective in addiction by reducing the release of these chemicals.<sup>14-16</sup>



**Figure 1:** Door control theory

## EFFECTS OF ACUPUNCTURE

### Immunity enhancing effects

Acupuncture increases body resistance to many diseases. It produces many different changes in the levels of leukocytes, opsonins, kinins, and antibodies. It provides regulation of immune activity. Studies have been carried out on the effect of acupuncture, especially on T-Lymphocytes, and it has been found that it has an increasing impact on the release of interferon from lymphocytes. The leukocyte count increases approximately three hours after acupuncture, and this increase continues for 24 hours. An increase in phagocytic activity is also seen in hepatic cells. In particular, stimulation of the Large Intestine-4 (Li-4) point, which has 360 receptors, and the Stomach-36 (St-36) points, increases the number of T-helper cells.<sup>17,18</sup>

### Anti-inflammatory effects

ST 36 is one of the most critical points for balancing Qi and Blood and supporting overall health. In a study investigating how acupuncture at the ST36 acupuncture point regulates inflammation and its underlying mechanisms, acupuncture at ST36 has been found to have clinical benefits in attenuating inflammation through several means, including vagus nerve activation, toll-like receptor 4 (TLR4)/NF- $\kappa$ B signaling, macrophage polarization, and mitogen-activated protein kinase (MAPK).<sup>19</sup>

### Sedative effects

Acupuncture therapy also has sedative effects. Its sedative effect can be combined with other techniques in complex conditions such as depression, anxiety, and insomnia. The sedative effect occurs due to changes in brain chemicals such as dopamine and serotonin. Anxiety, believed to be caused by hyperactivation of the sympathoadrenal

system, can be relieved with endorphins. Anxiety can be reduced by inhibiting the tone of the sympathoadrenal system by acupuncture and making endorphins secreted.<sup>18-20</sup>

According to the literature, acupuncture is effective in reducing anxiety related to cataract surgery under topical anesthesia.<sup>21</sup>

### Homeostatic effects

The autonomic nervous system constantly and automatically controls the internal organs. Sympathetic and parasympathetic nerves mediate this control. With the application of acupuncture, both sympathetic and parasympathetic effects are created. Heart rate, blood pressure, respiratory system, and endocrine system can be affected by acupuncture application. Particular nerves are stimulated when specific skin points suitable for the patient's complaints are produced to heal the disease. Through these, electrical impulses first go to the spinal cord, then to the lower center of the brain, and then to the diseased area. As a result, acupuncture provides homeostasis through the autonomic nervous system, regulates the water and electrolyte balance, and turns hypotension and hypertension into normotension by regulating the vascular system. In addition, it regulates the heartbeat with impaired blood sugar, regulates sweating and body temperature, and regulates urinary and stool excretion.<sup>18</sup>

### Uses of acupuncture

Today, acupuncture effectively treats many health problems, such as pain, cardiovascular diseases, neurological diseases, obesity, depression/anxiety, and asthma. It is noteworthy that it is trendy today and has an intense use.<sup>22</sup>

There are many studies in the literature in which acupuncture is used to treat various pains.<sup>23-25</sup> In a meta-analysis of forty-nine randomized controlled studies, it was reported that the positive effects of laser acupuncture in treating musculoskeletal pain were prominent in approximately two-thirds of the studies, and these effects were more evident in long-term follow-up.<sup>23</sup> In a meta-analysis study in which 1218 participants were examined, it was reported that acupuncture was more effective than pharmacological agents in terms of analgesic effect in the treatment of migraine.<sup>26</sup>

In a systematic review investigating acupuncture treatment in cardiovascular diseases, a total of 17 studies from the last 20 years were examined, and it was stated that acupuncture could be a complementary and alternative treatment for many cardiovascular diseases, especially coronary artery

disease and hypertension.<sup>27</sup>

It is known that acupuncture also has positive effects on asthma. In a case report of a 45-year-old male individual being followed up with the diagnosis of asthma, It has been reported that acupuncture treatment applied to the patient for 12 sessions caused a significant reduction in the patient's complaints and contributed to maintaining well-being.<sup>28</sup>

Acupuncture treatment is also an alternative for brain damage or neurological degenerative disorders. Behavioral and neural responses of 10 outpatients with Parkinson's disease were examined before and after 8-week electroacupuncture treatment, and it was reported that the treatment had beneficial clinical effects.<sup>29</sup>

### **Acupuncture in obesity treatment**

There are many studies in the literature regarding the use of acupuncture in treating obesity.<sup>30,31</sup> Various hypotheses have been proposed regarding the effects of acupuncture treatment on obesity. These hypotheses are primarily based on the regulation of the neuroendocrine system. It has been reported that the effects of acupuncture on obesity occur in the form of decreased food intake and body weight loss due to the inhibition of some orexigenic factors, such as Neuropeptide-Y and ghrelin, and the expression of anorexigenic factors such as leptin.<sup>31</sup> Acupuncture may play a role in regulating the effects of the hypothalamus-pituitary-adrenal cortex and sympathetic adrenal cortex; In addition, it has been reported that it can regulate lipid metabolism by reducing serum triglyceride, total cholesterol and low-density lipoprotein (LDL), and reduce bacteroids in the body, thus being effective in the treatment of obesity.<sup>32</sup>

In a systematic review of 12 randomized controlled studies investigating the efficacy of acupuncture and body weight loss in Asian individuals and 1151 participants, it was reported that acupuncture significantly reduced BMI and waist circumference. In addition, it has been reported that the combination of medical nutrition therapy-exercise-acupuncture is more effective than diet and exercise alone and that acupuncture monotherapy or acupuncture-exercise combination does not make a significant difference compared to exercise alone.<sup>33</sup>

In a pilot study in which ten healthy adults were examined, it was reported that weekly auricular acupuncture application for a month caused a significant decrease in body weight and active ghrelin levels in individuals compared to sham acupuncture. In the study, individuals' food intake

reductions were evaluated over the meals recorded by digital cameras.<sup>34</sup> Similarly, in another study conducted on 66 postpartum obese individuals, individuals were randomly divided into two groups. Five sessions of laser and sham acupuncture were applied to the groups per week, and no intervention was made on the dietary habits of the individuals; instead, food consumption records were taken. It was reported that the laser acupuncture group's BMI and body fat percentage decreased significantly compared to the sham acupuncture group after twelve sessions of application. However, it was stated that there was no significant difference in waist-hip ratio between the two groups, and there was no significant difference in the daily energy intake of the groups.<sup>35</sup>

### **Appropriate dietary approaches combined with acupuncture**

There are still uncertainties about whether acupuncture practices alone are effective in treating obesity. In addition, there is evidence that it stimulates some anorexigenic hormones, inhibits some orexigenic hormones, and, as a result, suppresses appetite. It has been reported in the literature that these effects of acupuncture are much more effective when applied together with diet and exercise. Acupuncture application provides a positive decrease in the patient's appetite in about one week. The patients who will have acupuncture are calculated according to their weight, and the dietitian gives the appropriate diet.<sup>31,34,36,37</sup>

National and international guidelines or guidelines have yet to be published for appropriate weight loss diets to be applied with acupuncture. When the literature is examined, it is seen that the principles on which the diets applied together with acupuncture are based, the amounts of energy and macro-micro nutrients could be more precise. In a study examining the effectiveness of a combination of electroacupuncture and slimming diet program against diet monotherapy in the treatment of obesity, It has been reported that individuals are given diets containing an average of 1400 kcal of energy, with 55-60% of total daily energy coming from carbohydrates, 25-30% from fat, and 15-20% from protein, taking care not to be below basal metabolic rates.<sup>38</sup> In a study investigating the effectiveness of laser acupuncture and a low-calorie diet in treating postmenopausal visceral obesity, it was reported that the daily energy needed to be calculated for individuals should be reduced by 1000 kcal. Therefore, a diet plan containing an average of 1200-1500 kcal energy was made, with 10-15% of



the total daily energy coming from protein, 25% from fat, and 60-65% from carbohydrates. In addition, individuals have been recommended to eat 5-6 meals daily and consume 3-4 liters of fluid.<sup>39</sup>

In many studies, the characteristics of the diets applied with acupuncture were not explicitly mentioned. Instead, it was stated that a nutritionist or dietitian programmed the diet programs, and expressions such as high fiber, energy-restricted, and low energy were used. As understood from all these studies, in medical nutrition therapy approaches applied together with acupuncture; The amount of power given to individuals is considerably lower than the daily needs of individuals.<sup>39-41</sup>

### **Safety of acupuncture**

The recommendation of acupuncture, a complementary and alternative medicine practice, by clinical practice guidelines and guidelines remains to be determined. The studies have not reported severe adverse effects of acupuncture applications on health. In a systematic review of 105 studies on the safety of acupuncture in pregnancy, Park et al. said that most adverse events were mild to moderate. However, it has been reported that the most common negativity is pain caused by needling, and the relationship between severe adverse events and deaths with acupuncture is not specific. In addition, it has been reported that the incidence of adverse events associated with acupuncture is 1.3%, and acupuncture is safe when applied correctly during pregnancy.<sup>42</sup>

The study has negative aspects of acupuncture: organ and tissue injuries, infections, local side effects, and other complications. The most common organ and tissue injuries seen in patients were reported to be pneumothorax, spinal cord injuries, subarachnoid or intracranial hemorrhages, cardiac tamponade, or cardiac injuries. The most common infections in patients are hepatitis, abscess, tetanus, ear infections, etc. It has been reported that the most common local side effects are contact dermatitis, local allergies, argyria, local bleeding, local pain or tenderness, and local burning or bruising. Other common complications in patients were reported to be dizziness, syncope, nausea, vomiting, and epilepsy. For these reasons, it was emphasized that the education level of the acupuncturist should be at a good level.<sup>43</sup>

### **CONCLUSION AND RECOMMENDATIONS**

Acupuncture is a traditional complementary and alternative medicine method that can be applied in

various forms, the history of which dates back to the written periods. While the current literature is convincing that acupuncture is safe, it also mentions the existence of some negativities that can be encountered, albeit rare, during the application. It says that acupuncture practitioners should have sufficient education levels in this regard.

The effectiveness of acupuncture in treating obesity has been demonstrated in many studies. However, uncertainties regarding the mechanism of this activity remain. Against the view that acupuncture can be effective alone in treating obesity, the opinion that it is more effective to be applied together with weight loss diet programs has come to the fore in some studies. Data on the principles and contents of weight loss diet programs applied together with acupuncture in the literature still need to be expanded today. However, according to the data reported by these limited sources, the amount of energy contained in these diets can be pretty low. Deficient calorie diets have many known adverse effects on health, particularly micronutrient deficiencies. Suppose such diets are to be applied for a long time. In that case, regular clinical follow-up of these patients' biochemical parameters and body composition by relevant specialists is essential. For these reasons, medical nutrition therapy is applied together with acupuncture treatment in obese individuals by a physician and a dietitian; it must be controlled with individual-specific diets suitable for adequate-balanced nutrition. In addition, well-equipped teamwork is vital to prevent all kinds of negativity, mild or severe, and to provide the best possible treatment to the patients throughout the process; The role of the attending physician in this team is very critical.

Acupuncture reduces the appetite of obese patients, increases their compliance with diet and exercise, and reduces the anxiety caused by hypocaloric nutrition with the anxiolysis effect it creates. It also accelerates metabolism by providing homeostasis in the body and enables patients to lose weight. In these multidisciplinary treatment approaches, it would be very beneficial to include acupuncture, one of the complementary and alternative treatment methods for treating obesity.

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