

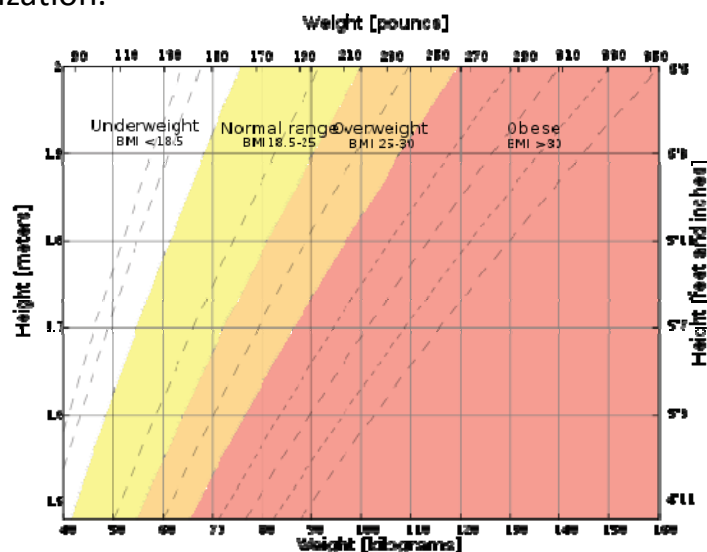
Investigating Massage as a Complementary Therapy for Weight Loss

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Obesity and excess body fat in The United States is a growing health risk to many Americans. The Center for Disease Control (CDC) has called The United States “obesogenic”, referring to the environmental factors that contribute to and promote obesity, such as; physical inactivity, encouraged increased food intake, and the presence of unhealthy foods.

In a recent survey conducted through the Behavioral Risk Factor Surveillance System, 25.6 respondents were obese. Of the obese respondents the gender line was fairly equal with 26.4% of men and 26.8% of women reporting obesity. Younger obesity trends were hand and hand with 19.1% of males and females ages 18-29 reporting obesity. Though shifting slightly, older men and women aged 50-59 reported nearly equal prevalence of obesity with 31.7% and 30.2%, respectively. Though these statistics are frightening, other estimates put the total population of obese people in the United States at 72 million or about 1/3 the total population. More alarming than that, the estimated percentage of adults living with obesity is nearly 66%, or over 200 million adults.

Obesity is characterized by excess adipose tissue leading to and increased Body Mass Index or BMI. The BMI compares an individual’s height to their weight and determines if they are underweight, normal range, overweight (used synonymously with pre-obese), or obese. Figure 1. shows the divisions of BMI compiled from data drawn up by the World Health Organization.



Measured in metric units, the BMI states that an individual is overweight when their mass to height ratio is between 25kg/m² to 30kg/m² and obese when an individual exceeds 30kg/m².

The BMI thresholds are:

Below 18.5	Underweight
18.5-24.9	Normal weight
24.5-29.9	Overweight
30 and greater	Obese
40 and greater	Morbid or extreme obesity

Obesity has been shown to increase the likelihood of accessory maladies including high blood pressure, heart disease, cancer, gallbladder disease, diabetes, osteoarthritis, gout, and stroke. For instance, because adipose cells are endocrine cells, they secrete extra amounts metabolites, cytokines, lipids, and coagulation factors. Of primary importance is the secretion of insulin by adipose cells and tissue. The excessive secretion in these tissues is the reason so many obese people contract type II diabetes. The adverse maladies that can be contracted from excessive body fat lead to an increased mortality rate among obese people. In a study from the New England Journal of Medicine, 527,265 people ages 50-71 were tracked for 10 years. Of these, 61,317 died by 2005. When factors such as smoking (another leading health risk contributor) were taken out, risk of death was found to be associated with both overweight and obesity in both men and women. Upon further analysis, the study concluded that "Excess body weight during midlife, including overweight, is associated with an increased risk of death."

However, it is not only health issues that are at risk in when evaluating obesity. Because of an increased likelihood of additional health risks, there is also an increased cost to treat the obese. Data from The Obese Society shows that the obese-attributable medical expenditures are estimated to be over \$75 Billion dollars in the united states. It is grossly apparent that obesity is a national problem and immediate steps must be taken to combat this health epidemic.

However, there is no prescribed one-size-fits-all treatment for obesity. Obesity can be the result of one contributing factor or the confluence of many. Some factors include excessive dietary caloric intake, lack of physical activity, and genetic predisposition. Given that there are several known causes of obesity, and that there are combinations of those causes, it is easy to see that there would be many treatments available for the disease.

The goal of Obesity treatment is to reduce the BMI. Since it is nearly impossible to change a person's height, weight management techniques aim to reduce BMI through dietary changes, exercise, medications, and in some cases surgery. Of these options, exercise and dietary changes seem to be the safest as well as the most effective approaches to treating obesity.

In a study performed on MSG-programmed obese mice, rodent subjects were exposed to moderate exercise training to measure physiological changes in comparison to normal mice. Given 15 minutes of swimming, 3 days a week, for 10 weeks, obese mice were shown to have normalized glucose and insulin levels. In addition, the onset of obesity was abated.

Of particular interest is the higher level of activity found in the vagus nerve in obese mice compared to normal mice. The vagus nerve provides parasympathetic innervations to all the organs besides the adrenal glands. The vagus nerve also contributes to the exchange of communication between the gastrointestinal tract and the central nervous system (CNS). This higher level of nerve firing actually decreased in obese mice that received swim training. The results of the study inferred that the imbalance of autonomic activity and metabolic dysfunctions in the MSG-programmed obese mice was curbed by moderate exercise.

The vagus nerve does not need to be stimulated through mechanical means. The autonomic nervous system regulates many organs throughout the body. This system is comprised of two complementary systems, the sympathetic nervous system and the parasympathetic nervous system. The sympathetic nervous system allows for a response to stress and controls what is commonly called the fight-or-flight response. On the other hand the parasympathetic nervous system has the reverse effect and acts to calm the body in what is termed the rest-and-digest response. Both systems innervate cardiac muscle via the vagus nerve. The sympathetic acting to increase the rate and strength of the heart beat while the parasympathetic acts to decrease the rate of heart beats.

The parasympathetic system is naturally activated during massage. In a study comparing light pressure massage to medium depth pressure, 20 healthy adults had electrocardiograms taken during their massage therapy sessions. During the 15 minute massage, those receiving medium depth pressures elicited a high frequency of heart rate variability suggesting a increase to their efferent vagal activity. Furthermore, this group showed a decrease in the ratio of high frequency to low frequency ratio that inferred a shift from sympathetic to parasympathetic states during the first part of their massage treatment.

It is apparent that stimulation of the vagus nerve can have an effect on the rest-and-digest parasympathetic nervous system. Whether that stimulation comes from man or machine is of little consequence, however only machine has been shown to

help elicit a response that curbs food craving. **A study that links the benefits of massage to eating habits does not exist, though there is evidence to support its application.** Such a study would need to work with obese patients (having a BMI greater than 30) who are willing to undergo massage treatments several times during the day, after or between meals. Prolonged massage is not necessary, since 15 minutes of medium depth pressure has been proven to elicit the parasympathetic nervous system response. The objective would be to determine if activation of the vagus nerve via the parasympathetic nervous system response, after eating a “normal” sized meal, would leave the patient with a feeling of satiation and decrease caloric intake over time. Controls may be implemented by using “sham” massage as well as altering the number of massages received in a day.

Obesity is a major health concern and many treatments are available. Though some radical treatments may have been shown to be effective in the short term, the most lasting and therapeutic effects are the result of the most natural and personal commitments. Healthy diet and exercise have been tested and shown that they are effective. **If massage can be shown to be another tool to combat obesity, it may be a very powerful one.** It will give those afflicted with obesity another weapon with which to combat their illness. The Nation itself suffers from this illness, and if more holistic and easily accessible treatments are not found, a financial burden will be put on us all.

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