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Ozone Therapy as an Adjunctive Modality for Weight Reduction in Grade II Adult Obese Subjects

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ABSTRACT

The purpose of this study was to evaluate the effectiveness of ozone therapy as an adjunctive modality for weight reduction in grade II adult obese subjects. **Subjects:** *thirty grade II adult obese subjects from both sexes had BMI 30-40. They ranged in age from 25 to 45 years. They were classified randomly into two groups of equal number. Group 1: fifteen patients received ozone therapy with diet. Group 2: fifteen patients received diet regimen only.* **Procedures:** *evaluation procedures in form of measurement of BMI and waist circumference pre treatment and after three months post treatment, and therapeutic procedures for group 1: ozone therapy with low caloric diet, for group 2: low caloric diet only. The results showed a statistically significant decrease in BMI, and waist circumference in both groups, with a higher rate of reduction in ozone with diet group.* **Conclusion:** *It could be concluded that ozone therapy can be used as an adjunctive modality for weight reduction in grade II adult obese subjects.*
Key words: *Ozone therapy, BMI, waist circumference, and low caloric diet.*

INTRODUCTION

Obesity is the most common metabolic disorder in humans; there are many etiologic causes for obesity[11].

Excess fat accumulates because there is imbalance between energy intake and expenditure. This can arise in different ways and obesity is a clinical sign with several possible causes. There is no etiological classification of obesity but a number of factors are known to be associated with its development[8].

The most widely used index of obesity is the body mass index (BMI) which correlates well both the direct measures of fatness and morbidity and mortality. Body mass index = weight in Kg/ height in m^2. Studies showed that BMI actually is a measure of body fat related to height rather than percent of body fat and that is a better measure of obesity than percentage of body fat. The BMI gradually increases with age of both genders with no consistent difference between men and women[1].

Waist circumference has been recognized as a useful measure of obesity. In 1998, Professor Mike lean, of Glasgow University, showed that a waist circumference in men of $\geq$ 102 cm and in women $\geq$ 88 cm carried the same risk of developing cardiovascular disease as a BMI of 30. This is because waist circumference is a measure of visceral or abdominal, fat mass independent of height and muscle mass[1].

It is therefore a very useful indicator of excess body fat and increased health risk. During a weight loss programme one cm reduction in waist equates to a 1 kgm body fat loss waist circumference is easily measured using a simple measuring tape, specially designed and carry coloured section to indicate levels of increased risk. The patient should be standing and relaxed, and shirt or blouse should be raised. Asking the patient to pass the tape around the waist. The tape should be placed laterally at the midpoint of the iliac crest, and centrally positioned one cm below the umbilicus. The patient should have exhaled gently. Waist circumference is most reliable if performed by the same clinician each time[3].

Caloric restriction has remained as the ministry of treatment of obesity. It improves most of the lipid abmormalities, expect H.D.L. level which decreased further. Diet ranges from mild caloric restriction to total starvation, one of the best ways to achieve healthier weight is to adopt a healthful diet with an energy intake that doesn't exceed expenditure, is low in fat, and provides adequate amounts of all food groups, including whole grains and cereals, fruits and vegetables[2].

Without doubt, commercial diets are the only way for some people to cope with the challenge of weight management. However, for others the goal is to develop for themselves the skills and the motivation to mange their diet and lifestyle in a manner that suite them[7].

Diets are regulated selections of foods, specially designed and prescribed for medical and, general nutritional reasons. The dietary treatment is fundamental to the management of obesity, but unless the obese person is willing and able to make long term changes in lifestyle treatment[10].

The most appropriate diet and the most likely to result in weight loss is a low. Fat diet, rich in complex carbohydrates and well balanced protein and other nutrients. There are two types of diet. Low calorie diet and very low calorie diet[7].

Oxygen or Ozone Therapies are used by a number of alternative medicine practitioners around the world. The chemistry sounds very straightforward, Human body fat is a combination of three elements - hydrogen, carbon and oxygen molecules (plus other substances that are stored within the fat cells). Adding extra oxygen to the body fat, and in theory it should break down into two well known substances: Hydrogen & oxygen molecules (H2O - water, which enters the blood stream, goes through the kidneys and is then excreted via urination), Plus Carbon & oxygen molecules (CO2 - carbon dioxide, which is excreted via respiration)[15].

SUBJECTS
MATERIAL AND METHODS

Subjects

Thirty grade II adult obese subjects from both sexes (20 female and 10 male) had BMI 30-40. They ranged in age from 25 to 45 years. They were classified randomly into two groups of equal number. ***Group 1:*** Fifteen patients received ozone therapy in form of rectal insufflations day other day for three months with low calorie diet. ***Group 2:*** Fifteen patients received only low calorie diet. Waist circumference and body mass index were measured pre and post treatment program.

Inclusion criteria; all patients were grade II adult obese from both sexes (20 female and 10 male) had BMI 30-40. They ranged in age from 25 to 45 years.

Exclusion criteria, Patients who received weight reduction drugs, surgery for weight reduction, sever uncontrolled hypertensive patients, patients with cardiac or autonomic

disorder, also post menopausal women, contraceptive pills, and endocrine disorders were excluded.

Ethical consideration, The experimental protocol was explained in details for each patient before the initial assessment and informed written consent were obtained from all participants. The trial protocol was approved by the meeting of the department of surgery, faculty of physical therapy, Cairo University. There was no harm inflicted on the patients. On the contrary, all had benefited from the final results of the study.

MATERIAL AND METHODS

1- Measurement procedures:

a. Weight and height scale (standard height and weight scale) was used for measuring height/cm and weight/kg before and after the study. BMI (Body Mass Index); this index is calculated by dividing weight in kilogram by height in meter squared.

$$BMI = \frac{Weight\ in\ kgm}{Height\ (M)^2} \quad [16]$$

b. Waist circumference was determined by placing a measuring tape snugly around the waist. Normal value in female as 35 inches and normal value in male is 40 inches[3].

2-Treatment procedures:

a. Ozone therapy application:

Each patient in group I, received ozone therapy in form of rectal insufflations with ozone concentration of 20 μg/ml, increased gradually up to 40 μg/ml and the volume was ranged from150-300ml.Three syringes of 50 ml were filled with ozone from the generator total ozone dose of 150 ml) with the appropriate concentration was delivered the ozone into the rectum via the catheter in the first session, then the dose and concentration of the ozone were increased gradually in the subsequent sessions to reach the maximum range (ozone dose of 300 ml, concentration of 40 μg/ml by using 6 syringes).Before starting the first treatment session, each patient was instructed carefully about the ozone therapy procedure as well as, its safety, values and effects to gain her confidence and cooperation during the treatment sessions.Also, each patient was advised and instructed to evacuate

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her bladder and rectum before starting each ozone therapy session.Each patient was assumed a relaxed modified side lying position, then the catheter was held and lubricated with a neutral lubricant (KY gel), and closed by the clamp before inserting it into the rectum through the anus. After that, the syringe was introduced into the free end of the catheter, and then the clamp was removed and the ozone was injected into the catheter, after that, the catheter was closed with the clamp again, to change the syringe. This procedure was repeated from 3 to 6 times according to the ozone dose which was used. Finally, the catheter was removed from the patient's rectum, when all the syringes were used. Then each patient was instructed to clean her anus by using sterile dressing and instructed to rest for 5 minutes.Frequency: The procedure was repeated two times weekly. Duration: Total duration time was six months[10].

b. Recommended diet regimen:

Patients received low calorie diet only. Where patients received caloric intake below 1200 cal./ day. This diet was used for 3 days at a time and followed by 4 days normal eating and repeat the 3 days after 4 days of normal eating[7].

Day 1:
Break fast: Black coffee or tea , ½ grapefruit , 1 slice toast and 1 cup peanut butter
Lunch: ½ cup tuna or 1 slice cheese,1 slice toast and Black coffee or tea
Dinner: 2 slics any type meat,1 cup string beans and 1 small apple
Day 2:
Break fast: Black coffee or tea,1 Egg, slice toast and ½ bananas
Lunch: 1 cup cottage cheese or ½ cup tuna, 5 saltine crackers and   Black coffee or tea

Dinner: 1 cup broccoli or cabbage,½ cup carrots,½ bananas and1 cup vanilla ice cream
Day 3:
Break fast: 5 saltine crackers, 1 slice cheddar cheese and 1 small apple
Lunch: 1 boiled egg, 1 slice toast and Black coffee or tea.
Dinner:1 cup tuna , 1 cup carrots,1 cup grains, 2 cup cantaloupe and ½ cup vanilla ice cream[12].

Statistical Analyses

The collected data was statistically analyzed using SPSS software statistical computer package version 12. for each variable, the range, mean and standard deviation were calculated. The difference between two means before and after treatment was statistically analyzed using the paired students (t) test. Significance was adopted at $P<0.05$.

RESULTS

Statistical analysis of data by using analysis of no variance was performed to detect the significance level, mean and standard deviation for the effect of diet only and diet and ozone therapy on body weight, BMI and waist circumferences of these subjects.
The results were presented as follow:

Data presented in table (1), Fig. (1) show that the values of body weight was that, for group 1 the mean value before study was (112.67 ± 23.40) while after treatment was (92.13 ± 17.92). There was a significant difference. While for group 2, the mean value before treatment was (108.27 ± 15.30) while after treatment was (98.87 ± 14.02). There was a significant difference.

Table (1) : The mean values of body weight before and after treatment Kg.

Variables	Group 1			Group 2			P-value	Significant
	Range	Mean	SD.	Range	Mean	SD.		
Before	76-169	112.67	23.40	90-140	108.27	15.30	0.149	S
After	70.140	92.13	17.92	75-125	98.87	14.02	0.268	S
t-value	10.342			9.740				
P-value	0.001			0.001				
Significant	S			S				
% of improvement	18 %			9%				

Level of significance at P <0.05,   SD = Standard Deviation,   MD= Means Difference,
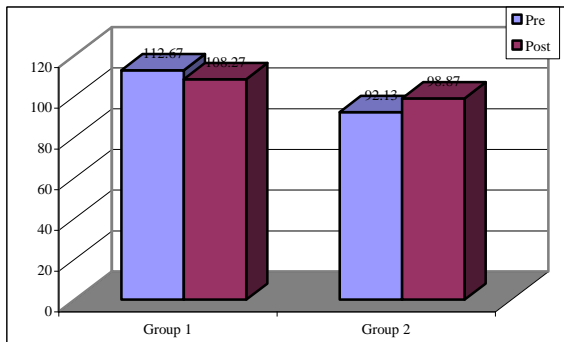P-Value = probability value,   t -value = paired t-Test

Fig. (1): Pre and post values of body weight of both groups.

Data presented in table (2), Fig. (2) show that the values of BMI was that, for group 1 the mean value before study was (39.53 ± 6.17) while after treatment was (30.67 ± 3.89). There was a significant difference. While for group 2, the mean value before treatment was (39.53 ± 6.17) while after treatment was (30.67 ± 3.89). There was a significant difference.

Table (2) : The mean values of body mass index (BMI) before and after treatment Kg/m².

Variables	Group 1			Group 2			P-value	Significant
	Range	Mean	SD.	Range	Mean	SD.		
Before	30-51	39.53	6.17	32-53	39.33	5.78	0.393	S
After	25-40	30.67	3.89	28-46	34.80	4.84	3.432	S
t-value	11.743			11.311				
P-value	0.001			0.001				
Significant	S			S				
% 0f improvement	22%			11.5%				

Level of significance at P <0.05,   SD = Standard Deviation,   MD= Means Difference,
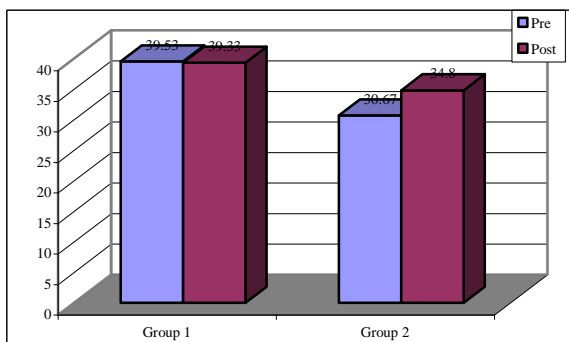P-Value = probability value,   t -value = paired t-Test

Fig. (2): Pre and post values of body mass index of both groups.

Data presented in table (3), fig. (3) show that the values of waist circumference was that, for group 1 the mean value before study was (119.47 ± 13.61) while after treatment was (100.20 ± 8.80). There was a significant difference. While for group 2, the mean value before treatment was (111.67 ± 12.77) while after treatment was (102.60 ± 11.56).There was a significant difference.

Table (3) : The mean values of waist circumference before and after treatment Kg/m².

Variables	Group1			Group 2			P-value	Significant
	Range	Mean	SD.	Range	Mean	SD.		
Before	89.140	119.47	13.61	95-140	111.67	12.77	0.048	S
After	83.115	100.20	8.80	83.130	102.60	11.56	0.549	S
t-value	10.030			7.953				
P-value	0.001			0.001				
Significant	S			S				
% 0f improvement	16%			8%				

Level of significance at P <0.05,   SD = Standard Deviation,   MD= Means Difference,
P-Value = probability value,   t -value = paired t-Test

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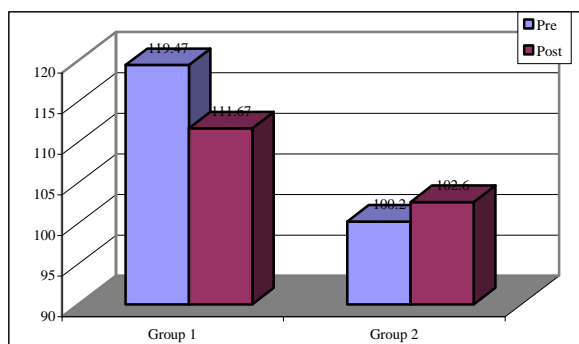
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Fig. (3): Pre and post values of waist circumference of both groups.

DISCUSSION

This study designed to evaluate the effectiveness of ozone therapy on weight reduction in grade II adult obese subjects. Thirty grade II adult obese subjects from both sexes had BMI 30-40, ranged in age from 25 to 45 years, classified randomly into two groups of equal number. Group 1: fifteen patients received ozone therapy with diet. Group 2: fifteen patients received diet regimen only. Measurement of BMI and waist circumference pre treatment and after three months post treatment, results showed a statistically significant decrease in BMI, and waist circumference in both groups, with a higher rate of reduction in ozone with diet group.

The results of this study were in agreement with[13] who concluded that, the more restrictive diet, the more rapid weight loss, but the greater the risk of non compliance. In general a caloric deficit of about 7700 kcal leads to a loss of about one kilogram of fat. Estimation of total daily caloric needs (about 25-30 kcal per kg of body weight) allow one to calculate the daily caloric deficit required to achieve a given rate of weight loss[2].

Found that, one benefit of the very low calorie diet is the rapid loss, often 3-4 pounds or more per week, and the rapid medical improvement, such as significant reduction in blood pressure, decrease in serum cholesterol of 20% -25% and dramatic lowering of glucose level in diabetics.

Also,[12] studied the effects of 28 day, of a very low calorie diet (382 kcal/day) on the beta adrenergic lipolytic response and nutritive blood flow in adipose tissue. This study demonstrates an increase in the lipolytic responses to isoprenaline and dobutamine during the hypocaloric diet[9].

Reported that, high protein diet cause suppression of appetite through out the body's excessive fat mobilization and the formation of ketone bodies. In addition to the high specific dynamic action of protein part diet compared to a well-balanced meal of equal caloric value. The calorigenic effect of protein ingestion is due to digestive process as well as the extra energy required by the liver to assi8milatc amino acids. So many factors to be considered in formulating a sound program for weight loss. High protein diet that advised by some authors was found by many other authors to have harmful strain on kidney and liver function and result in dehydration, electrolyte imbalance and lean tissue loss.

In the present study fifteen patients received ozone therapy in form of rectal insufflations and showed significant reduction in BMI and waist circumference .These results were supported with[10,4,14]. As they found that using of ozone therapy dissolves fat, decrease the resistance to insulin action, accelerates glycolysis and increase metabolic activation parameters.

But the results were Contradict to, studying had been performed by[6] on obese patients were suffering from knee osteoarthritis to reduce their weight. Apparently about 50% of ozone treated patients does not clarify if ozone therapy may be useful.

It has been reported that ozone activates the enzymes involved in peroxide or oxygen "free radical" distraction as glutathione, and catalase. Also accelerates glycolysis (Break down of glycogen)[14].

One cause of over eating is the widespread use of oral antibiotics. While destroying the target germs, these drugs also kill off one's intestinal flora, which are needed for healthy digestion. As a result, the sensation of hunger comes more often and lasts longer, so the body tries to compensate for ineffective digestion by increasing the amount ingested[4].

Each breath now gives more life than it was able to in the bloods earlier state. Most lived native peoples, who are not affected by our more common diseases, either includes

fasting as a regular part of their yearly food cycles, or eat much less overall, than industrial peoples. Today many Americans exist at such high levels of toxicity, that their toxic reactions when attempting to fast can seem intense enough to make them start eating again before any serious cleansing can be accomplished. Fortunately one can partially, by pass the lungs and get the blood level back up, by taking oxygenated water internally and through the skin. Several weeks of detoxification of this regimen will also make it much easier to fast without discomfort, if one chooses. It reduces appetite, logically enough, to a level more in line with the body's actual needs[5]. Ozone improve the metabolic rate enable the tissues to make better use of glucose[10].

Ozone therapy also lowers cholesterol and triglycerides level. It encourages and maximizes the expulsion of carbon dioxide from our bodies, carbon dioxide that is the waste matter created when the oxygen dissolves body fat[14].

Localised Obesity can easily be prevented in most cases with an appropriate diet and healthy lifestyle. There is no doubt that ozone acts efficiently as a lipolytic agent because as soon as ozone dissolves in the interstitial water, lipids are the preferential substrate and they are broken down to a number of derivatives, such as lipoperoxides, hydroperoxides and small molecular weight[5].

It was also proved that ozone therapy is useful in treating autoimmune diseases when it was with other complementary approaches[14].

Ozone lowers cholesterol and triglycerides level, it also encourages and maximizes the expulsion of carbon dioxide from the body carbon dioxide that is the waste matter created when the oxygen dissolves body fat[10].

Systemically, ozone oxidizes organic compounds and has the ability to peroxidize lipids.(break- up fats)[4].

Also ozone therapy not only improves the physiology of circulation but possibly enhances the insulin secretion and may decrease the resistance to insulin action[1].

The chemistry sounds very straightforward, Human body fat is a combination of three elements - hydrogen, carbon and oxygen molecules (plus other substances that are stored within the fat cells). Adding extra oxygen to the body fat, and in theory it should break down into two well known substances: Hydrogen & oxygen molecules (H_2O - water, which enters the blood stream, goes through the kidneys and is then excreted via urination), Plus Carbon & oxygen molecules (CO_2 - carbon dioxide, which is excreted via respiration)[15].

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الملخص العربي

العلاج بالأوزون كوسيلة إضافية لإنقاص الوزن في الأشخاص البالغين البدناء بسمنة درجة ثانية

يهدف هذا البحث إلي دراسة تأثير العلاج بالأوزون على إنقاص الوزن في الأشخاص البالغين البدناء بسمنة درجة ثانية من كلا الجنسين. وقد أجريت هذه الدراسة علي ثلاثين متطوعا ممن تتراوح أعمارهم بين 25 إلى 45 سنة ممن يعانون من سمنة درجة ثانية ، وقد تم تقسيمهم عشوائيا إلي مجموعتين متساويتين في العدد ، المجموعة الأولي: تلقت العلاج بالأوزون بواقع 3 جلسات أسبوعيا بالنفخ الشرج ي وعلاج بتنظيم الوجبات الغذائية وذلك لمدة ثلاثة أ شهر . والمجموعة الثانية: تلقت علاج بتنظيم الوجبات الغذائية فقط وكانت قيمة السعرات الحرارية للوجبة 1200 سعر حراري ، وكان ذلك لمدة ثلاثة أشهر ، وقد أظهرت النتائج فروق ذات دلالة إحصائية بين المجموعتين بعد العلاج بالنسبة لمؤشر كتلة الجسم ومحيط الوسط وكانت نسبة التحسن افضل فى المجموعة الاولى (الاوزون وتنظيم الوجبات) وذلك بالمقارنة بالمجموعة الثانية (تنظيم الوجبات) ولذاك فان الاوزون يمكن ان يستخدم كعلاج مساعد فى انقاص الوزن .

الكلمات الدالة : الأوزون-مؤشر كتلة الجسم -محيط الوسط- علاج بتنظيم الوجبات الغذائية .