



## Combined effects of physical exercise and green tea on obese people

*Habibeh zare , Fatemeh Soltani Sarvestani*

Biology Department ,payame noor university,19395-4697 Tehran,I .R.of IRAN

Ahvaz Medical university & IRAN Physiotrapy clinic in shiraz-IRAN

**Correspondence Author :-** Habibeh zare Biology Department ,payame noor university,19395-4697 Tehran,I .R.of IRAN

*This research was done on 60 overweight or obese people (BMI $\geq$ 25) that were recruited from an unselected population of the people who were willing to lose weight in Iran Physiotherapy Clinic, Shiraz, Iran. Anthropometric data including measuring weight (With the sensitivity of 100 grams), height, waist (with the sensitivity of 1 millimeter) before eating breakfast with the least coverage and without shoes by the help of Bourer Digital Scale and meter according to standard instructions by the Physiotherapist before and after the intervention were gathered. Waist measuring was done from the region between ribs and hip bone. Body Mass Index (BMI) was calculated for all the people with the formula of weight (kilogram) divided to squared height (meter). These persons were randomly divided into two groups; with green tea drink and placebo.*

*All the people of the first group (30 persons) were wanted to drink green tea. Each one would drink 4 glasses of green tea before breakfast, lunch, evening meal and dinner daily for a period of 2 weeks. The diet for all 60 persons in this study was supervised attentively in order to consume fat, carbohydrate, sugar, minerals, fruit, vegetable and generally speaking, all nutritional substances under the thoroughly control. All these ones (60 persons) had a 2-hour- scheduled mixed program of physiotherapy an sport for 5 days a week in these 2 weeks as will described below.*

**Key word:**Diet ,physiotrapy,green tea, human

### **Green Tea: prevention or treatment**

Tea is the most popular drink among Iranian families. Commonly it is used in all ceremonies as a means of welcoming the guests. Although consumption of green tea is common in the minority of Iranian families, this certainty is possible that people by the help of knowledge about the advantages of this kind of tea will be absorbed toward using up this valuable drink more and more.

Tea plant grows in hot climate. Smaller and fresher leaves are chosen for producing tea. Generally speaking, there are three sorts of tea: black, green and Lolangtea(a kind of Chinese tea).The supremacy of green tea among other kinds is because of its quality that is influenced very little in the processes and therefore its components remain constant. Green tea is also anti-cancer and anti-oxidant.

These traits are related to a substance in the green tea which is named ‘katchin’ that its anti-oxidant activity is very high and in comparison with other famous anti-oxidants like vitamin C and E, acts more powerful. Drinking green tea can reduce the possibility of catching different illnesses, from simple bacterial ones to the chronic ones like heart diseases , stroke, cancer, oral and dental diseases and osteoporosis.

Prevention from cardiovascular diseases:

Green tea can also prevent from outbreak of cardiovascular diseases. Drinking 5 cups of this tea or more every day can decrease catching cardiovascular diseases to 61%.Existance of free radicals in arteries can lead to cardiovascular problems, whereas katchin in green tea is able to protect the internal wall of the artery from free radicals and therefore prevents from cardiovascular diseases.

In Japan although smoking cigarette is very common and usual, statistics show the least cardiovascular diseases there. Furthermore because of the nature of green tea that can reduce bad cholesterol (LDL), three glycerin and fibrinogen, this kind of tea can restrain atherosclerosis

### **Reduction of three glycerin:**

Katchin in green tea can restrain the activity of lipase of pancreas. On account of this fact, breakdown of lipid and changing it to absorbable substances happens very slowly. As increasing blood three glycerin after

each meal is a risk factor in the outbreak of heart diseases, drinking a cup of green tea between the meals is an appropriate solution for reducing blood three glycerin.

**Anti coagulant:**

Green tea can cause the blood dilution and thus prevents from blood clotting. Consuming meat and non-saturated oil like corn and soya oil cause some compositions to be made in the body that result in making blood plagues. Whereas drinking green tea can prevent from making blood plagues.

Other point that should be mentioned is that prevalently after heart attacks, some proteins are produced in the body that lead to cellular death. But katchin in green tea can stop and blockade the activity of these proteins and accordingly the possibility of heart and brain strokes will become the least and the speed of recovery will increase.

### **Decreasing blood pressure:**

Drinking 0.5 to 2.5 cups of green tea can reduce the risk of hypertension to 64%, while drinking more than 2.5 cups daily can decrease the risk of this disease to 65%. Consequently drinking 4 cups of green tea is recommended.

### **Prevention from diabetes:**

Parallel to aging process usually blood sugar increases. Particularly if we do not pay enough attention to our diet, our weight will increase by passing the time and accordingly the probability of diabetes type 2 will rise too. Drinking 5 cups of green tea daily can prevent from diabetes. Green tea can miraculously prevent from phenomena caused by diabetes such as cataract and renal diseases, but how can green tea decrease blood sugar? The most principal mechanism is suppressing the activity of amylase enzyme. By suppressing the activity of this enzyme, starch will breakdown very slowly and hence blood sugar will rise with low speed.

Furthermore green tea can decrease intestinal absorption of glucose and lipid and by means of this ability cause people to lose weight. The weight in the persons who drink green tea is 1% to 81% less than those who do not drink it.

### **Other advantages:**

Green tea can prevent from cancer. The rate of outbreak of the cancers such as breast, colon, skin, pancreas and stomach among the people who drink green tea is very low. In Japan despite having the highest rate of smoking cigarette according to statistics, the fewest number of cancers has been found. Studies show that more drinking the green tea has a relationship with decreasing breast cancer. Green tea can also detoxify liver and prevent from gathering lipids there. Moreover green tea is able to compensate the lack or shortage of estrogen in menopause time and prevent from osteoporosis. Additionally drinking green tea leads to spirit calmness and consequently afternoon drink of it is recommended for stopping tiredness.

In order to keep green tea fresh, it is better to put it in a dark jar and place it in the cabinet far from light and dampness. For each person, we should strew 1 dessertspoon of green tea in a teapot and for each one add a glass of hot water (80 degree of centigrade). Then after 6 to 7 minutes can serve it. It is worth remembering that green tea is not like black tea which needs to be stewed.

### **Study method:**

This research was done on 60 overweight or obese people ( $BMI \geq 25$ ) that were recruited from an unselected population of the people who were willing to lose weight in Iran Physiotherapy Clinic, Shiraz, Iran. Anthropometric data including measuring weight (With the sensitivity of 100 grams), height, waist (with the sensitivity of 1 millimeter) before eating breakfast with the least coverage and without shoes by the help of Bourer Digital Scale and meter according to standard instructions by the Physiotherapist before and after the intervention were gathered. Waist measuring was done from the region between ribs and hip bone. Body Mass Index (BMI) was calculated for all the people with the formula of weight (kilogram) divided to squared height (meter). These persons were randomly divided into two groups; with green tea drink and placebo.

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these ones (60 persons) had a 2-hour- scheduled mixed program of physiotherapy an sport for 5 days a week in these 2 weeks as will described below.

### **Materials, Instruments and methods:**

#### **Using BEAUTISTIM 680B machine:**

This is applied for Functional Electrical Stimulation(F.E.S) on abdominal and Waist regions of persons (these parts of the body in overweight or obese people usually have more fat masses than other body regions) plus using Hot Pack at the same time for heat effects accompanying William's exercises(a group of isometric and isotonic exercises for abdomen and back) and stabilizer exercises for pelvic and low back region with and without Physioball (abdominal and low back muscles have compensatory actions with each other in controlling size of abdomen and lumbar lordosis ) lying in supine position on the therapeutic couch. The above electrical instrument is a kind of Low Frequency one controlled with its microcomputer and is a means of electrical stimulations for neurons and muscles. It is an effective way for regional sliming and localized fitness. Because by the help of F.E.S current of this instrument on mentioned regions, several muscular groups will be stimulated simultaneously. Contractions of these muscular groups with these stimulations affect venous and lymphatic flow in segmental and regional stage, and this matter leads to the focus of treatment on obese parts of the body. The therapeutic programs of this instrument for this goal is called: Lipolysis and removing excessive fat.

Hot Pack or in another name, Hydrocoular Packs contain a kind of silicone gel that are wrapped in a cotton bag. This gel can absorb large amounts of water. Gel is put in cotton pockets in the main bag that makes the pack flexible. These packs are put in a water tank with the heat of 75 to 80 degree of centigrade to become hot with an electrical element .To use these packs , we should wrap them in special towels and put on the limb for 20 to 30 minutes.

#### **2. Using Infra Red radiation accompanying regional handy massage:**

A) As we know the speed of chemical reactions increases with the heat. (Van Hoff law) .Hence metabolism which is a group of chemical reactions becomes faster with heat. The real change with applying each degree of centigrade is approximately 13% of the whole, so, for instance increasing the tissue temperature to 4 degrees of centigrade will raise the speed of metabolism to nearly 50%.

Commonly heat is applied before the main treatment according to this belief that it causes an increase in the blood stream, decrease muscle spasm while doing sport exercises and therefore leads to muscle relaxation. That is why heat is used before other therapeutic methods like massage or muscle stretching and also before sport medicine in physiotherapy with the aim of preparing the muscles. Thus in this study superficial humid heat (Hot Pack) is utilized while doing exercises and then dry heat (via Infra Red Radiation) plus handy massage is applied on the abdomen.

#### **B) Abdominal Massage:**

Abdominal massage may have many benefits that include better digestive function, stress reduction and muscle tone increase. But more studies are needed to prove this claim specifically. According to one study of National Health Institutions in 2009, abdominal massage was found as a way to decrease constipation, abdominal pain and increase bowel movements.

This point should be mentioned that all kinds of massage cause pressure in different degrees and amounts to the body. This pressure focused either on the abdominal part specifically or not, helps the blood and body liquids' stream and increases the metabolism speed. As, a favorite metabolism should help the body to return back the body harmony by helping the body to have more uniformed function, consequently massage is effective in better weight loss.

#### **3 .Aerobic Exercises:**

American Collage of Sport Medicine (ACSM) defines aerobic exercises as below:

“Any activity that involves large muscle groups and would be kept constantly and would be existed rhythmically in the nature.“ This is a kind of exercise that causes more force to the heart and lungs and therefore leads to more activity of these organs than their rest time.

Being active is a major part of every weight loss or control program. When you are active,your body consumes more energy (calories).Now, by burning more calories than your usual consumption, you will lose weight. On account of this fact that each 3500 calories is equal to 1 pound (0.45 kilograms ) of lipid, you

must burn 3500 calories more than your received calories to lose 1 pound of your weight. Therefore if you omit 500 calories of your diet every day, you will lose 1 pound weekly.(500\*7 days=3500 calories ).Exercise plus decreasing the received calories bring about a rise in weight lose process. Exercise is also efficient in weight maintenance and preventing from weight increase.

In this study we used light aerobic exercises (for 20 minutes) like abdominal muscles contraction while pressing the low back region to the cushion, Bridging (raising the pelvic floor) with abdominal contraction, Bridging with SLR (Straight Leg Raising), stabilizing exercises with Physioball, abdominal crunch plus F.E.S and Hot Pack (as described before).At the time of doing all these exercises, the hold phase of exercise is about 5 seconds and with abdominal contractions and also simultaneously with the hold phase of F.E.S. The rest phase of each exercise is 2 seconds with abdominal relaxation and relaxation time of F.E.S(2 seconds).Each exercise is repeated 20 times.

- Stationary bicycle (10 seconds).

- Abdominal Crunch Bench for abdominal muscles ( 7 minutes).

-Treadmill, and we use it with its special Weight Loss program. This program operates by getting personal data such as weight, height, maximum allowed speed and time of activity for each person. The hole time of this part including warm up phase, main sport and cool down for everyone is 20 minutes.

The significant point at this stage is utilizing NEURADYN 710L machine which stimulates the abdominal muscles through 2 electrodes placed on the abdomen and this machine produces Faradic stimulation (similar to F.E.S in function)plus a Hot Pack fastened with straps to the abdomen. The hold time of each stimulation is 3 seconds and the rest time is 1 second. These stimulations accompanying active abdominal muscle contractions at the hold time of electrical current cause muscular strengthening and removing local excessive fats.

-Wave Rower. It is a machine which exactly like canoeing causes aerobic exercises even in limited area of the clinic. It absolutely provides the best total body workout at home and clinic that engages all major muscle groups while the resistance is provided by water, so it is natural, quiet, and soothing. As you pull the Wave Rover handle toward yourself more and more forcefully, the water resistance becomes more and thus you will burn more calories. Its computer shows time, virtual passed distance, strokes per minute, calories per hour heart rate and watts. For each session, one should work with it for 10 minutes.

Roller: We stand on its circular surface while our knees are in the semi flexion position. Then we start performing rotatory movements of trunk to the right and left side for 5 minutes.

In the following chart, you can see the burned calories per hour according to people’s weight:

Sort of Activity (1-hour duration)	Calories burned for a person with 73 kilograms(160 pounds)	Calories burned for a person with 91 kilograms(200 pounds)	Calories burned for a person with 109 kilograms(240 pounds)
Aerobics, high impact	<b>511</b>	<b>635</b>	<b>763</b>
Aerobics, low impact	<b>365</b>	<b>455</b>	<b>545</b>
Rowing, stationary	<b>511</b>	<b>637</b>	<b>763</b>
Stair Treadmill	<b>657</b>	<b>819</b>	<b>981</b>

#### 4. Sauna:

In Guyton’s textbook of Medical Physiology, we find that producing one gram of sweat requires 0.586 kilo calories. The JAMA citation referred to above goes on to state that “ A moderately conditioned person can easily sweat off 500 grams in a sauna ,consuming nearly 300 kilo calories-the equivalent of running 2-3

miles. A heat-conditioned person can easily sweat off 600-800 kilo calories with no adverse effects. While the weight of water loss can be regained by rehydration with water, the calories consumed will not be.”

Burning 600 calories or more is possible in a sauna in only 30 minutes for every session. Therefore sauna has a bilateral role in weight loss and cardiovascular conditioning maintenance. Accordingly it is effective in weight loss or weight control and body fitness program.

Some of the authorities in the weight loss field believe that our body uses lipid to dilute the toxins. As sauna is an outstanding way for exiting the toxins from the body, it is a great way for helping the body to become free from any kind of fat which is stored in the body to dilute toxins.

##### 5. Different sorts of machines for passive movements and exercises:

A) Vibrator: This is used at the end of the first step for increasing the superficial blood circulation, causing muscle relaxation and preventing from muscle spasm. ( about 3 minutes)

B) House fit: This is used after Abdominal Crunch Bench for producing localized vibration on any part of the body that you place its belt on, like abdomen, lateral muscles of the trunk, back muscles and gluteal muscles. (7 minutes)

C) Crazy Fit: This kind of whole body vibrators. At the time of using this machine, a Hot Pack is fastened to the abdominal or lateral muscles of the trunk or other wanted places with local obesity firmly to use the heat effects simultaneously with the exercise.

This machine has different programs including P1, P2, and P3 for the weight loss goal. It is better and more efficient for the users to do frequent semi flexion and terminal extension of knee joints (Squat) while standing on its moving surface to get the benefits of compound aerobic and non-aerobic exercises in order to increase the calorie burning and have more efficient weight loss process.

Statistics without drinking green tea (the placebo group):

Age/Gender	Height(meter)	Abdominal size(centimeter)		Weight(kilogram)		BMI	
		Before the test	After the test	Before the test	After the test	Before the test	After the test
32 female	161	107	102	87	85	33.56	32.79
35 female	153.1	110	102	74.5	72.2	31.78	30.80
34 female	159	98	92	69.5	67	27.49	26.50
28 female	159	114	108	79.5	77.8	31.44	30.77
29 female	159.8	95.5	90	68.5	65.9	26.82	25.80
35 female	169.8	126	119	114.5	112.6	39.71	39.05
35 female	158.9	106	100	64.5	61.9	25.54	24.51
35 female	161	113.5	107	84	82.5	32.40	31.82
21male	163	111	105	89.5	86.5	33.68	32.55
24 female	160	104	99	70	68	27.34	26.56
23 female	158.7	89	81	64	60.5	25.41	24.02
35 female	170	129.5	121	99	95.3	34.25	32.97
35 female	166.8	118	109.5	81.3	77	29.30	27.67
25male	180.6	110	100.9	95	89.8	29.12	27.53
35 female	158.5	130	121	88.6	85.3	35.26	33.95
23 female	169	103	94	89	85.3	31.16	29.86
28 female	162	100	91.5	68	64.80	25.91	24.69
28 female	168	100	92.5	85.5	81	30.29	28.69
35 female	167	110	103	79.5	73.5	28.50	26.35
22 female	158.3	90	83	72	69	28.73	27.53
35 female	153	101	93	69	67	29.47	28.62

35 female	162	102	94	68.5	64.5	26.10	24.57
27 female	169	105	97	93.5	89.3	32.73	31.26
31 female	161.5	122.5	114	81.5	77	31.24	29.52
22 female	158.7	93.5	87	67.5	64.5	26.8	25.6
26 female	165.7	112	106.3	80	76.2	29.13	27.75

**Results:**

We found an outstanding effect of green tea on increasing the amount of weight loss in overweight or obese people.

Drinking the green tea had a remarkable effect on weight control and BMI in the group of green tea consumers.

**Conclusion:**

The results showed that drinking the green tea is efficient in persons' weight control and BMI, and also it was notable and interesting that in the test group at least 1 kilogram of weight loss was visible per week. Besides, freshness, liveliness, and green tea effects for removing depression and gloom were tangible in the majority of people (90%).

Due to the epoch making effects of green tea in toxins' exiting according to its powerful anti-oxidant effect, It is suggested to produce its extract in the shape of compact tablets.

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