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EVALUATION THE EFFECT OF CONTROLLED DIETS ON OBESITY TREATMENT

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ABSTRACT: This study aimed to evaluate the effect of low caloric diet on weight loss and improved cardiovascular risk in obese women's. The research was done on 20 respondents of Egyptian women's ranging between (30-50) years old and they have different obesity. They were divided into three groups A, B and C depended on the body mass index (BMI) and they were under experimental diets having low calories (1200-1500 kcal/day) for three months. Waist and hip circumference were measured before starting and after three months. Blood samples were also collected from the respondents and were analyzed for triglycerides, total cholesterol, low density lipoproteins (LDL) and high density lipoproteins (HDL). Results indicated that waist circumference, hip circumference, weight and BMI of all samples decreased significantly at the end of the experimental period in the different three groups as compared to beginning study. Moreover, this decrease was more pronounced for the group C which have the highest body measurements and body mass index at the starting of the experiment. Also, triglycerides, total cholesterol, HDL and LDL were decreased at the end of three months. The decrease was significantly in triglycerides and non-significant in HDL. So, it could be concluded that consuming controlled deities having low calories contents were effective for obesity treatment and decrease cardiovascular risks.

Key words: Low-calorie diets, weight loss, waist circumference and hip circumference.

INTRODUCTION

In recent years obesity has developed to a worldwide epidemic **(WHO, 2002)**. Obesity had become a burden on the health care cost, reducing quality of life with suffered of some diseases such as type 2 diabetes **(Yusuf et al., 2005)**, some kind of cancer and cardiovascular diseases (CVD) **(Hampel et al., 2005; Moghaddam et al., 2007)**. The prevalence of obesity is high in developing countries (**Hossain et al., 2007**), with cardiovascular diseases as the essential cause of death and by 2030 (**Wild et al., 2004**), over 62% of the people expected to develop diabetes, will be from the developing countries **(Reddy and Yusuf, 1998)**. World Health Organization **(WHO, 1995)** recommended the body mass index (BMI) to assess obesity, using cut-off points of 25 kg/m^2 for overweight and 30 kg/m^2 for obesity. Low-calorie diets

defined as a balanced ratio of carbohydrate, fat and protein in reduced quantities to provide an energy intake of 800 to1500 kcal per day **(Nicholas, 2001)**.

Many studies showed that the cause of obesity: over eating, decreased physical activity without appropriate reduction in food intake and genetic factors **(Hussein et al., 1993)**. In Egypt during eighties over weight and obesity were highest among mothers 63.1% (**Aly et al., 1981)** as well as during the nineties 58% (**Moussa et al., 1995)**. More than 66% of the population is overweight in Egypt and that's why Egypt holds the 5 place in the list of fattest countries (**Badran and Laher, 2011)**. In Egypt obesity is becoming a problem of public health concern affecting economic and social classes as well as different age groups. The scientific committee supported by WHO urged governments in different countries of world to set strategies to

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prevent and control the global epidemic of obesity. National survey on obesity in Egypt conclude that overweight and obesity prevalence is reaching an alarming rate, the problem increasing rapidly in adolescent, adults as well as children. So, this present study aimed to evaluate the effect of consuming controlled diets having low calories on obesity treatment and improved cardiovascular risk in obese women's.

SUBJECTS AND METHODS

The research was done on 20 Egyptian women lived in Cairo and aged between 30-50 years old who suffer of obesity and they were subjected to low caloric diet with 1200 to 1500 kcal/day for three months. The participants were divided into three groups according to the BMI before starting the experiment as follows:

Group A: Obesity Class I

This group suffers of low obesity with (BMI) 30 to less than 35 kg/m^2 and they are 4 women's and they followed by low-calorie diets with 1200 to 1500 kcal/day.

Group B: Obesity Class II

This group suffers of medium obesity with (BMI) 35 to less than 40 kg/m^2 and they are 9 women's and they followed by low-calorie diets 1200 to 1500 kcal/day.

Group C: Obesity Class III

This group suffers of high obesity with (BMI) equal and more than 40 kg/m^2 and they are 7 women's and they followed by low-calorie diets 1200 to 1500 kcal/day.

Experiment of Controlled Diets

Seven daily diets including breakfast, lunch and dinner and having from 1200-1500 kcal/day (30% protein, 10% fat, and 60% carbohydrates) were selected to be consumed by the respondents intervally day by day every week for a period of three months. The experiments for the controlled diets were carried out in one of the private obesity centers in Cairo.

The Body Measurements

Measures including high, waist circumference, hip circumference and weight were carried out from the studied samples before starting and at the end of the experimental period. Body weight was measured using electronic scales without shoes. Height was measured in standing position. Waist circumference was measured at the mid-point between the ribs and iliac crests, whereas, hip circumference at the widest girth of the hip using measuring tape. Body mass index was estimated according to **Peggy and Hui (2010)** as follows:

$$BMI = \frac{(\text{Weight in killograms})}{\text{Height in meters}^2}$$

Laboratory Investigations on Blood Samples

Blood samples were collected from six women (two from each group) who agreed from the participates. Two fasting blood samples were collected from the women, one before starting the study and the second at the end of the study period (3 months). Serum was immediately separated after centrifugation and kept frozen until analysis for triglycerides, cholesterol, LDL and HDL. Triglycerides were determined according to **Devi and Sharma (2004)**. Total cholesterol was determined according to Enzymatic Colorimeter **(Young and Friedman, 2001)**. HDL and LDL were determined according to **Young (2000)**. These analyses were carried out at National Nutrition Institute, Cairo.

Statistical Analysis

Data were analyzed using the SPSS program (version 20). T test was used to examine the differences within the group between the baseline and after consuming low-calorie diets for three months. Statistical significance of $P < 0.05$ was used for all groups.

RESULTS

Some Information about the participants

Results presented in Table 1 show some information about the respondents. It could be noticed that samples aged from 30-50 years old (2 were single and 18 were married). Concerning their height they were ranged from 158-175 cm. The weight of respondents ranged from 74- 147 kg.

Effect of controlled diets on some body measurements and weight loss

Results presented in Table 2 shows the effect of consuming controlled diets for three months by the studied samples on body measurements. Results indicated that both waist circumference (cm) and hip circumference (cm)

Table 1. Some information about the studied samples

Sample No.	Age (year)	Married state	Height (cm)	Weight (kg)
1	40	M	158	74
2	30	S	165	90
3	45	M	170	90
4	50	M	175	105
5	42	M	165	99
6	34	M	167	110
7	40	M	160	100
8	35	M	160	100
9	48	M	168	99
10	50	M	162	100
11	35	M	160	100
12	37	M	163	100
13	39	M	175	116
14	40	M	168	117
15	44	M	170	122
16	51	M	170	147
17	32	S	165	120
18	35	M	173	145
19	42	M	165	122
20	31	M	165	122

M: married   S: single

Table 2. Some body measurements of the studied samples as effected by consumption of controlled diet

No.	Waist circumference (cm)		Loss (%)	Hip circumference (cm)		Loss (%)
	Before starting	After 3 months		Before starting	After 3 months	
Group A						
1	90	81	10.0	115	105	8.7
2	100	90	10.0	115	104	9.6
3	105	93	11.4	130	116	10.8
4	100	90	10.0	122	110	9.8
Mean	98.75	88.5		120.5	108.75	
T-test	16.29 ***			13.76 ***		
Group B						
5	103	90	12.6	125	112	10.4
6	108	97	10.2	126	113	10.3
7	104	93	10.6	128	116	9.40
8	105	92	12.4	128	113	11.7
9	109	97	11.0	125	111	11.2
10	109	98	10.1	127	114	10.2
11	102	89	12.7	126	111	11.9
12	103	91	11.7	127	115	9.40
13	110	94	14.5	125	110	12.0
Mean	105.89	93.44		126.33	112.78	
T-test	13.17 ***			32.9 ***		
Group C						
14	121	105	13.2	140	122	12.9
15	123	105	14.6	141	122	13.5
16	125	110	12.0	143	125	12.6
17	120	104	13.3	138	120	13.0
18	127	111	12.6	140	124	11.4
19	120	101	15.8	143	123	14.0
20	120	103	14.2	140	121	13.6
Mean	122.29	105.57		140.71	122.43	
T-test	32.04***			38.59 ***		

*** $p < 0.001$

Table 3. Weight and BMI of the studied samples as effected by consumption of controlled diet

No.	Weight (kg)		Loss (%)	Body mass index (BMI)		Loss (%)
	Before starting	After 3 months		Before starting	After 3 months	
Group A						
1	74	62	16.2	29.6	24.8	16.2
2	90	75	16.7	33.1	27.5	16.9
3	90	80	11.1	31.1	27.7	10.9
4	105	90	14.3	34.3	29.4	14.3
Mean	89.75	76.75		32.025	27.35	
T-test	10.61 ***			10.15***		
Group B						
5	99	82	17.2	36.4	30.1	17.3
6	110	90	18.2	39.4	32.3	18.0
7	100	87	13.0	39.1	34.0	13.0
8	100	86	14.0	39.1	33.6	14.1
9	99	83	16.2	35.1	29.4	16.2
10	100	83	17.0	38.1	31.6	17.1
11	100	84	16.0	39.1	32.8	16.1
12	100	85	15.0	37.6	32.0	14.9
13	116	98	15.5	37.9	32.0	15.6
Mean	102.67	86.44		37.98	31.98	
T-test	23.08***			29.59***		
Group C						
14	117	90	23.1	41.5	31.9	23.1
15	122	102	16.4	42.2	35.3	16.4
16	147	122	17.0	50.9	42.2	17.1
17	120	100	16.7	44.1	36.7	16.8
18	145	120	17.2	48.4	40.1	17.1
19	122	97	20.5	44.8	35.6	20.5
20	122	95	22.1	44.8	34.9	22.1
Mean	127.86	103.71		45.24	36.67	
T-test	21.52 ***			20.41***		

*** $p < 0.001$

decreased significantly at the end of experiment period (3 months) in the different three groups of studied samples. Also, it could be noticed that this decrease was more pronounced for group C which have the highest body measurements at the starting of the experiment.

Results for the level of weight loss during three months of consuming the low calories controlled diets are presented in Table 3. Results indicated that weight of the studied samples of the three groups showed a wide variation of loss at the end of the experiment. Our results were associated with a decrease in the BMI for the experimental samples within the different groups. Furthermore, the results indicated that the decrease in weight and BMI in the different three groups of studied samples were statistically significantly. The loss of weight for the first group ranged from 11.1-16.7%, while, in the second group this loss ranged from 13-18.2%. The corresponding value for the third group was from 16.4 - 23.1%. Therefore, it could be noticed that the greatest weight loss was noticed in the third group (group C) which had the highest BMI at the starting of the experiment.

Effect of low calories diet on serum lipid level of studied samples

Results presented in Tables 4 and 5 show the effect of consuming low- calorie diets for three months on serum lipid level of respondents. Concerning total cholesterol, it could be noticed from the results presented in Table 4 that values of total cholesterol decreased after three months of experiment at a level ranged from 10.9% - 16.3% in the different three groups of studied samples. In addition, the results showed that the decreased in total cholesterol in the different three groups of studied samples was statistically significantly. While, values for triglycerides were decreased at levels ranged from 14.8% - 18.2% at the end of the experiment (3 months). Moreover, the results estimated that the decrease in triglycerides for A and B groups was statistically significant. With regard to values of serum LDL and HDL level of samples, it could be noticed from results presented in Table 5 that, these values were decreased at the end of experiment. Values of serum LDL were

decreased and the levels ranged from 11.4-15.6% in the different three groups of studied samples and the decrease was statically significantly in B and C groups. However, values of HDL levels were decreased at lower rate than that for serum LDL and ranged from 5.7- 7.9% and the decrease was non-significant.

DISCUSSION

The obtained results indicated that consuming the controlled diets for three months led to significant decrease in the body measurements being waist circumference and hip circumference of the participants. Moreover, both weight and BMI of the studied samples showed significantly decreased after three months of consuming the controlled diets and concomitant decrease in several cardiovascular risk factors in obese women. A similar finding was recorded by **Nassar (2014)** who illustrated that after three months the anthropometric measurements (hips, waist circumference, weight, and BMI) of obese female who consumed low-calorie diet were decreased significantly. Also, the controlled diets decreased both serum total cholesterol, triglycerides, HDL and LDL values. The obtained results could explained on the basis that controlled diets had low calories contents and this was associated with low fat and carbohydrates contents and high fiber and this resulted in the above mentioned observations. These results are in agreement with that reported by **Mann et al. (2007)** who stated that dieting is an effective treatment for obesity. Also, these results are in agreement with those reported by **Wing et al. (2011) and Wadden et al. (2012)** who reported that consumption of a low-fat diet intake and physical activity showed a great effect on obesity treatment. In addition, these results are in agreement with those reported by **Mansour et al. (2017)** who reported that consumption of controlled diets having low fat contents decreased serum total cholesterol, triglycerides, HDL and LDL in cardiac patients.

Conclusions

Using controlled diets having low calories (1200-1500 kcal/day) enabled obese subjects to lose weight and decrease cardiovascular risks.

Table 4. Effect of consuming low-calorie diets on serum total cholesterol (mg/dl) and triglycerides (mg/dl) of the studied samples

	Total cholesterol (mg/dl)				Triglycerides (mg/dl)		
Group	Before starting	After 3 months	Loss (%)	Group	Before starting	After 3 months	Loss (%)
A	230	205	10.9	A	180	150	16.7
	240	210	12.5		176	150	14.8
Mean	235	207.5			178	150	
T-test	11.0*				14.0 *		
B	255	220	13.7	B	200	170	15.0
	270	226	16.3		220	180	18.2
Mean	262.5	223			210	175	
T-test	8.78*				7.0*		
C	280	239	14.6	C	290	240	17.2
	295	250	15.3		300	250	16.7
Mean	287.5	244.5			295	245	
T-test	21.5 **				NS		

*$p<0.05$ ** $p<0.01$ NS: Not-significant

Table 5. Effect of consumption of low-caloric diets on serum low density lipoproteins (LDL) and high density lipoproteins (HDL) levels of studied samples

	LDL (mg/dl)				HDL (mg/dl)		
Group	Before starting	After 3 months	Loss (%)	Group	Before starting	After 3 months	Loss (%)
A	140	124	11.4	A	50	47	6.0
	160	135	15.6		52	49	5.8
Mean	150	129.5			51	48	
T-test	NS				NS		
B	175	155	11. 4	B	49	46	6.1
	180	158	12.2		42	39	7.1
Mean	177.5	156.5			45.5	42.5	
T-test	21.0**				NS		
C	190	161	15. 3	C	38	35	7. 9
	188	160	14.9		35	33	5.7
Mean	189	160.5			36.5	34	
T-test	57.0 **				NS		

** $p<0.01$ NS: Not-significant

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تقـيـيـم تأثيـر التحكـم فـي الـوجبـات الغـذائيـــة عـلـى عـلاج السـمنـة

ليلى أحمد الأمين ـ منال محمد السيد محمد شحاته ـ مديحة عبد الجواد الشيوي ـ أحمد علاء الدين النشوي

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تهدف هذه الدراسة إلى تقييم تأثير نظام غذائي منخفض السعرات الحرارية على فقدان الوزن وتحسين خطر الإصابة بأمراض القلب والأوعية الدموية في السيدات البدينات، أجريت هذه الدراسة علي عينة مكونة من ٢٠ سيدة مصابة بالسمنة بدرجات متفاوتة في عمر يتراوح ما بين ٣٠ ـ٥٠ عاماً، وقد تم تقسيمهن إلى ثلاث مجموعات (أ، ب، ج) طبقاً لمؤشر كتلة الجسم، وقد تم وضعهن تحت نظام غذائي يحتوى على وجبات منخفضة السعرات الحرارية بحيث يتراوح محتوي السعرات المتناولة يومياً من ١٢٠٠ـ ١٥٠٠ كيلو كالوري وذلك لمدة ثلاثة شهور، وقد تم قياس محيط الوسط والأرداف قبل بداية التجربة وبعد ثلاث شهور، كما تم سحب عينات من الدم من المشاركات وتم تقدير دهون مصل الدم والتي اشتملت على الكوليستيرول الكلي والجليسريدات الثلاثية والليبوبروتينات مرتفعة الكثافة والليبوبروتينات منخفضة الكثافة، وقد أظهرت النتائج حدوث انخفاضاً معنوياً في مقاييس الجسم والتي شملت محيط الوسط ومحيط الأرداف وكذلك في وزن الجسم ومؤشر كتلة الجسم في الثلاث مجموعات وذلك بعد انتهاء فترة التجربة بالمقارنة مع بدايتها، وعلاوة على ذلك، كان هذا الانخفاض أكثر وضوحاً للمجموعة (ج) ذات مقاييس الجسم ومؤشر كتلة الجسم المرتفع في بداية التجربة، كما أوضحت نتائج تحليل عينات الدم الي حدوث انخفاض واضح في قيم دهون مصل الدم والتي اشتملت على الكوليستيرول الكلي والجليسريدات الثلاثية والليبوبروتينات مرتفعة الكثافة والليبوبروتينات منخفضة الكثافة بنهاية فترة التغذية لمدة ٣ شهور وكان هذا الانخفاض معنوياً في الكوليستيرول الكلي وغير معنوياً في الليبوبروتينات مرتفعة الكثافة مما يُشير إلي فعالية تناول هذه الوجبات الغذائية المحددة منخفضة السعرات الحرارية لعلاج السمنة وتقليل مخاطر الإصابة بأمراض القلب والأوعية الدموية.