

# Effect of Nutritional Counseling on Nutritional Status of Overweight/Obese Women

Tahira Perveen, Zia-ud-Din  
Department of Human Nutrition, University of Agriculture, Peshawar, Pakistan

## Abstract

A longitudinal study was conducted in Kamra District Attock, to evaluate the effect of nutritional intervention in changing the life style of women. Our sample of 200 overweight/obese women (BMI >25, free from chronic diseases, non pregnant/lactating women, age >20 years) were randomly assigned into two groups, intervention (n=100) and non-intervention(n=100). Interventional group received nutritional counseling sessions for six month aimed to improve the physical activity, increase the intake of fruits, vegetables and decrease saturated fats. Data on demographic, socioeconomic status, anthropometric, health measurements (body weight, body mass index, waist to hip ratio, random blood glucose, blood pressure) dietary habits and physical activity level were assessed at baseline, 3 month, 6 month and at 12 month(follow up) in both groups. After 6 month of follow up it was observed that health parameters and anthropometric measurements were significantly reduced among the individuals in the intervention group. Moreover, there was significantly increase in intake of fruits, vegetables, fiber and decrease in the caloric intake( $P<0.05$ ) which help in weight loss. Due to intervention there was significant improvement in life style of women, MET min/week was 1167.4 at 12 month (follow-up) which was greater than recommended 600min/week( $P<0.05$ ). Nutritional counseling programmes had beneficial effect on body composition, dietary habits and physical activity which lead to long term weight loss.

**Keywords:** obesity, physical activity, dietary guidelines, weight loss, nutritional counseling

## 1. Introduction

Obesity is common prevalent disease through the world (WHO 2009). Overweight and obesity result from high caloric intake, frequent consumption of fast food and inactive physical inactivity. There are five leading causes of adult mortality including cancer, hypertension, diabetes, heart disease and stroke; overweight is one of the major causing factors for all of these disorders (Brown et al.2010)

Proper dietary intake and physical activity is important in the treatment of excess overweight (Tsigos et al. 2008). Appropriate nutrition and life style include balance food from all food groups, vitamins and minerals intake from all dietary sources and physical activity. Physical activity play important role in reduction of weight in obese patients. Leisure time physical activity should be carried out for at least 30 minutes a day; this is recommended for all age groups of adults decreases abdominal fat and prevent loss of muscle (Wyatt et al. 2002; Schoeller et al. 1999). Behavioral therapy is helpful in treatment of weight loss and weight maintenance. The American Heart Association (AHA) evaluated intervention programme that promote the dietary and physical life style changes (Artinian et al.2010) and along with this recommended motivational interviewing for the initial weight loss up to 6 month and then further follow up to 1 year for effective weight loss (Bennett et al. 2007).

Nutritional counseling is both art and science. It is an on-going process in which a nutrition professional works with an individual to assess his or her usual dietary intake and also identify areas where change is needed. The nutrition counselor provides information, support, educational materials and follow-up the individual which is helpful to maintain the dietary changes.

There should be behavior modification programmes in which individual or group counseling session of patients to improve eating behavior. This is helpful to reduce consumption rate of junk foods (Nammi et al. 2004).

## 2 Research Methodology

### 2.1 Screening and recruitment

The follow-up study was conducted from February 2012 to January 2013, 200 women were randomly selected and screened for nutrition status. Inclusion criteria included age >20 years, body mass index (BMI) >25, non-pregnant/lactating women and free from chronic diseases. One woman from each family fulfilling the inclusion criteria was enrolled for study..

### 2.2 Study Protocol

Selected women were randomly allocated into intervention and non-intervention groups (100 women in each group). At baseline data was collected from both groups, including anthropometry, socioeconomic data, dietary intake, blood pressure and random blood glucose level. All the questionnaires were pre-tested before visiting the study subjects. Nutritional counseling sessions were given only to the intervention group with the interval of two weeks up to 6 month and then followed up further for six month to observe the impact of relatively long term

nutritional counseling. The education material was prepared in Urdu language so that all the respondents can understand it easily. Additionally, it was explained verbally the role of nutrition and physical activity in the health and wellbeing; healthy and appropriate dietary practices and its relationship with normal physical and health status in each counseling time. The intervention group received counseling on role of physical activity and dietary pattern in weight loss and maintenance. Subjects were encouraged about different types of leisure time exercises e.g brisk walk, light exercise such as abdominal muscles stretching and indoor games that involve physical exertion. Similarly, women were also asked to reduce sedentary activities like watching TV and sitting for long hours. The dietary intervention included increased intake of whole cereals, vegetable oil, leafy vegetables, fresh fruits, legumes and low fat meat and dairy products. Similarly, women were convinced to use high dietary fiber such as raw salad and avoid soft drinks and junk foods. A part from quality, the quantity of dietary intake was also considered in intervention.

### **2.3 Assessments**

Data on anthropometric measures, health measurements, life style activity (dietary intake and physical activity) and demographic – socioeconomic variables were assessed at baseline, 3 month, 6 month and at 12 month. Food consumption was assessed using food frequency questionnaire and 24 hrs dietary recall method. In food frequency questionnaire women were interviewed about the frequency of different food items consumed in a week along their portion sizes and recorded in questionnaire. According to the condition if there was consumption of more unhealthy food they were counseled to decrease the frequency of unhealthy food and use the healthy food which was helpful in weight loss. Physical activity was assessed through questionnaire. Subjects were asked about the frequency and time spent in practices of exercises, leisure time physical activities, usual work, walking and sedentary activities.

Body weight was measured with subjects wearing light clothing and no shoes using calibrated scale. Height was measured with a measuring tape. Waist circumference was measured at the level of the umbilicus. Hip circumference was measured at widest part of hip. Using sphygmomanometer, blood pressure of the selected women was recorded with the subjects in a comfortable seated position and the right arm fully exposed and resting on a supportive surface. Two readings of both systolic and diastolic blood pressure were taken at least 5 to 10-min apart and then mean of the two measurements were calculated and recorded. Random blood glucose level of the study subjects were measured by using glucometer. This was a simple and feasible way to determined blood glucose level by finger prick method.

### **2.4 Statistical Analysis**

All the statistical analysis were carried out using SPSS. Differences between the expected frequencies and the observed frequencies in one or more categories of interventional and control groups, like dietary practices, socio economic characteristics, level of physical activity and life style etc. were determined using the chi-square tests (Moore 1978). The effect of intervention on anthropometric measurements, blood pressure, dietary behaviour & intake and blood glucose was assessed by running general linear model (Nelder and Wedderburn, 1972) in SPSS. Paired sample t-test was used for comparison of groups before intervention and after intervention.

## **3 Results and Discussions**

Table 1 shows general demographic socioeconomic characteristics of the study cohort. Mean age of the women was  $31.9 \pm 5.4$  years ( $n=200$ ). Mean monthly family income was Rs.  $45.9 \pm 11.7$  thousands. Most of the subjects were married (70%) and living in nuclear type of family (77%). No differences in the groups were evident for demographic socioeconomic characteristics ( $p>0.05$ ).

**Table- 1 Demographic and socio-economic status of study groups**

Indicators	Whole Cohort (n=200)	Women groups		p-value
		Intervention (n=100)	Non-Intervention (n=100)	
		<b>Mean ±SD</b>		
Age (year)	31.9±5.4	32.1±5.1	31.7±5.7	0.532
Income, Rs. (000,)	45.9±11.7	46.5±10.9	45.3±12.4	0.475
		<b>Number of women (%)</b>		
Marital Status				
Single	60 (30%)	29 (29%)	31 (31%)	0.877
Married	140 (70%)	71 (71%)	69 (69%)	
Family type				
Nuclear	154 (77%)	74 (74%)	80 (80%)	0.401
Joint	46 (23%)	26 (26%)	20 (20%)	
Children				
1-2	25 (18.2%)	11 (15.9%)	14 (20.6%)	0.764
3-4	59 (43.1%)	30 (43.5%)	29 (42.6%)	
> 4	53 (38.7%)	28 (40.6%)	25 (36.8%)	
Women education				
Illiterate	71 (35%)	36 (36%)	35 (35%)	0.630
SSC* or lower	48 (24%)	23 (23%)	25 (25%)	
Undergraduate	49 (24.5%)	22 (22%)	27 (27%)	
Graduate	32 (16%)	19 (19%)	13 (13%)	

SSC=Secondary School Certificate

**Anthropometrics and health measurements of the women at baseline**

Results on anthropometric and health measurements of the cohort are presented in table 2. As shown in the table, overall women were closed to the lower limit of range for grade-I obesity (mean BMI: 31.9±3.9 kg/m<sup>2</sup>). Similarly, mean waist to hip ration (WHR) of the women was 0.81 which shows that on average, women had a tendency towards central obesity (WHO 1999). Mean systolic blood pressure, diastolic blood pressure and random blood glucose level of the women were 119.1±8.0 mmHg, 81.2±6.9 mmHg and 135.0±10.5 mg/dl respectively. Overall, both means systolic and diastolic blood pressure of the women were closed to the standards (Cifkova et al. 2003). When the groups were compared for health measurements, no differences were evident in any characteristics (p>0.05). Intensity of the leisure time physical activity is presented as metabolic equivalent of Task (MET). Mean MET min / week indicates that the study women were on average had a sedentary life style. It is confirmed that women had to spend more time in activities involving mostly setting position or indoor mild movement. No statistical differences were evident in physical activity between groups (p>0.05)

**Table - 2 Anthropometric and health measurements of study groups**

Indicators	Whole Cohort (n=200)	Women groups		p-value
		Intervention (n=100)	Non-Intervention (n=100)	
		<b>Mean ±SD</b>		
<b>Anthropometrics <sup>1</sup></b>				
Weight (kg)	83.1±10.9	83.1±10.9	82.3±11.1	0.605
Height (cm)	161.6±4.0	161.3±3.9	162.0±4.0	0.230
BMI	31.9±3.9	31.9±3.9	31.3±3.9	0.316
WC (cm)	97.2±7.4	97.6±7.1	96.9±7.8	0.454
% BF	38.8±3.0	38.8±3.0	38.4±3.1	0.762
IBW (kg)	57.5±2.8	57.3±2.8	57.8±2.9	0.232
<b>Health <sup>2</sup></b>				
SBP (mmHg)	119.1±8.0	119.7±7.8	118.5±8.2	0.312
DBP (mmHg)	81.2±6.9	81.7±6.7	80.8±7.2	0.353
RBG (mg/dl)	135.0±10.5	135.4±10.3	135.2±10.6	0.845
MET min/week	123.8±11.9	123.0±11.2	124.4±12.6	0.426

<sup>1</sup>BMI= Body Mass Index; WC= Waist Circumference; BF= Body Fat; IBW= Ideal Body weight; <sup>2</sup> SBP=Systolic Blood Pressure; DBP=Diastolic Blood Pressure; RBG= Random Blood Glucose level

**Energy intake and eating behavior score of the study population at baseline**

Table 3 depicts mean dietary energy intake and eating behavior score of cohort as well as of the groups at baseline. Mean energy (kcal) intake, % energy from carbohydrate, CHO, % energy from fat, % energy from

Protein and dietary fiber (g) of the women were 2800.6±441.9, 57.5±8.3, 33.3±3.9, 9.6±1.9 and 16.3±6.5 respectively. Eating behavior score of the women was 19.1±1.8. When groups were compared, there was no significant difference in dietary intake of energy and fiber, and eating behavior score ( $p>0.05$ ).

**Table 3: Energy intake and eating behavior score**

Indicators	Whole Cohort (n=200)	Women groups		p-value
		Intervention (n=100) Mean ±SD	Non-Intervention (n=100)	
<b>Energy Intake</b>				
Total energy intake(Cal)	2800.6±441.9	2785.9±455.4	2815.3±429.9	0.639
% Energy from CHO	57.5±8.3	57.7±7.6	57.4±8.9	0.751
% Energy from Fat	33.3±3.9	32.8±3.9	33.7±3.92	0.109
% Energy from Protein	9.6±1.9	9.8±1.9	9.5±1.9	0.279
Daily fiber intake(g)	16.3±6.5	15.6±6.8	17.0±6.1	0.120
Eating behavior score	19.1±1.8	19.1±1.8	19.1±1.8	0.704

**Effect of intervention on nutrition and health status of women**

Effects of nutrition intervention on changes in body anthropometric (weight, BMI, % Fat, WC) and health parameters (systolic and diastolic blood pressure SBP & DBP; random blood glucose level, RBG) were investigated using appropriate statistical procedures.

Table 4 shows findings on the effect of intervention on changes in anthropometric and health measurements (baseline and at follow-up or 12 month) as well as mean measurements of the groups in all time points. Mean differences in weight, BMI, % body fat and WC in the intervention group were -5.6 kg, -2.1 kg/m<sup>2</sup>, -4 %, and -4.4 cm respectively; all of the final measurements were significantly different from the baseline ( $p<0.001$ ) indicating a potential effect of nutrition intervention on these measurements. Similarly mean differences in SBP, DBP and RBG were -1.5 mm Hg, -2.4 mm Hg and -12.1 mg/dl respectively. In a recent study conducted by Aggarwal et al. (2007), a significant decrease was evident in BMI (27.70 to 25.56 kg/m<sup>2</sup>), systolic blood pressure (154.7 to 150 mm Hg) and diastolic blood pressure (91.8 to 87.4 mm Hg) after intervention in a group of women aged 40 to 60 years. Thus, nutritional counselling play important role in bringing significant changes in anthropometric and health measurements. In non- intervention group, an increasing trend in all anthropometric and health measurements except SBP was observed though the trend was slight but statically important ( $p<0.05$ ).

**Table-4: Effects of interventions on changes in body anthropometric, health measurement and physical activity**

Measurements	Baseline	Intervention Period			$\Delta^*$	p-value**
		3 month	6 month	12 month		
<b>Intervention group</b>						
Weight (kg)	83.1±10.9	80.7±11.9	77.5±12.7	77.5±13.1	-5.6	<0.001
BMI	31.9±3.9	31.0±4.5	29.8±4.8	29.8±4.9	-2.1	<0.001
% Fat	38.8±3.0	36.1±3.3	35.3±2.5	34.8±2.6	-4	<0.001
WC (cm)	97.6±7.1	94.8±6.8	92.3±5.4	93.2±9.8	-4.4	<0.001
SBP (mmHg)	119.7±7.8	117.8±8.4	118.3±8.7	118.2±6.4	-1.5	<0.001
DBP (mmHg)	81.7±6.7	80.2±5.5	78.9±7.7	79.3±6.4	-2.4	<0.001
RBG (mg/dl)	135.4±10.3	127.1±9.1	124.9±10.5	123.3±12.0	-12.1	<0.001
<b>Non-Intervention group</b>						
Weight (kg)	82.3±11.1	82.5±11.6	82.7±11.4	82.9±12.1	0.6	0.019
BMI	31.3±3.9	31.4±4.1	31.4±3.9	31.6±4.3	0.3	0.021
% Fat	38.4±3.1	37.8±2.2	36.8±1.6	38.9±3.1	0.5	<0.001
WC (cm)	96.9±7.8	96.8±7.1	97.6±8.9	97.6±6.6	0.7	<0.001
SBP (mmHg)	118.5±8.2	118.8±7.2	119.8±8.0	118.6±11.0	0.1	0.897
DBP (mmHg)	80.8±7.2	81.6±7.1	81.3±7.5	81.4±7.3	0.6	<0.001
RBG (mg/dl)	135.2±10.6	133.0±6.8	133.6±8.5	136.1±11.0	0.9	<0.001
MET_min/week	123.0±11.2	-	-	1167.4±323	1044	<0.001

\*Difference between measurements at baseline and 12 month \*\*p-value for paired sample t-test for groups before and after intervention (baseline & 12 month)

**Figure-1: Weight loss status during intervention and at follow up period by groups**

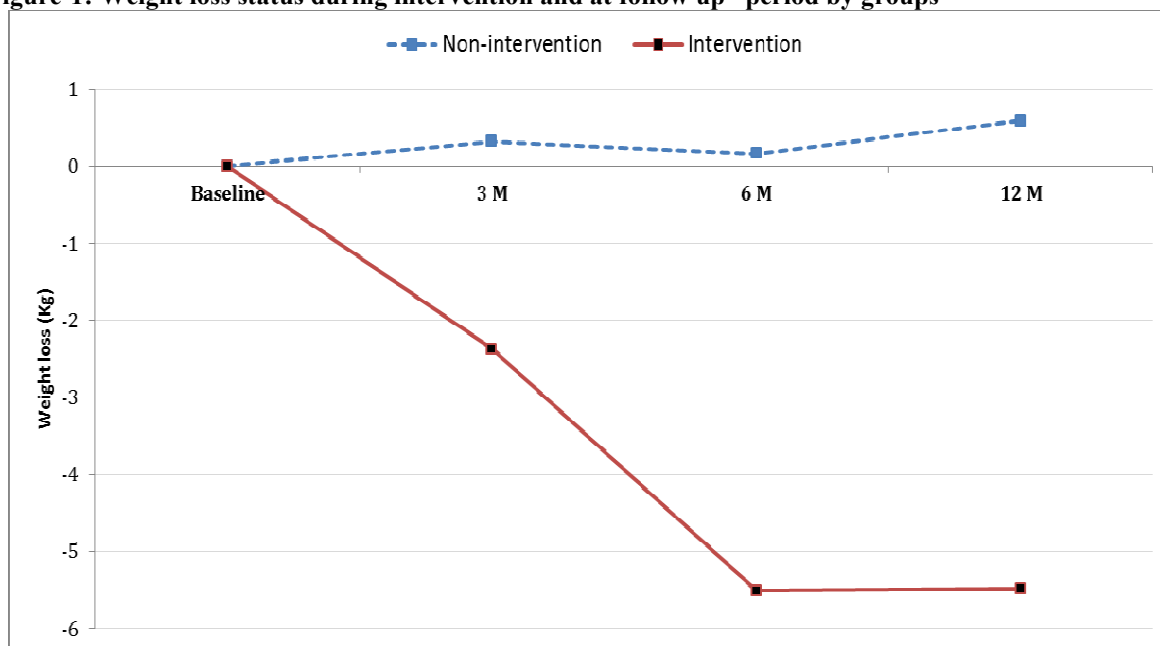


Table 5 depicts that during intervention there was significant decrease in eating frequency with the decrease in energy reduction as shown in table-9. There was significant decrease in the intake of fat and percent energy derived from dietary lipid at 12 months ( $p < 0.001$ ). A significant increase ( $p < 0.001$ ) was also evident in dietary fiber intake. In the current study, a significant reduction in total energy intake in the intervention group suggests that women adapted to consume low energy rich food items in response to intervention. Eating behavior score of women were increased from baseline which suggested that they adopted healthy eating pattern.

**Table-5 Energy and macronutrient intakes in groups at baseline and follow up**

Energy/macronutrients	Baseline	12 Month	$\Delta^*$	% change	<i>p-value</i> **
	Mean $\pm$ SD				
<b>Intervention group</b>					
Energy intake, Cal	2785.9 $\pm$ 455.4	2142 $\pm$ 337.1	-643.5	-23.09%	<0.001
Carbohydrate, g	302.0 $\pm$ 86.9	236.5 $\pm$ 15.9	-65.5	-21.5%	<0.001
Fat, g	101.8 $\pm$ 20.9	63.0 $\pm$ 4.6	-38.7	-38.2%	<0.001
Protein, g	68.2 $\pm$ 17.6	59.9 $\pm$ 3.1	-8.3	-11.7%	0.021
% energy from fat	32.8 $\pm$ 3.9	19.3 $\pm$ 2.7	-13.5	-39.4%	<0.001
Dietary fiber, g	15.6 $\pm$ 6.8	21.3 $\pm$ 4.3	5.7	37%	<0.001
Eating behavior score	33.7 $\pm$ 7.6	42.3 $\pm$ 12.9	8.6	20%	0.023

### Conclusion

The study concluded that frequent interventional programmes should be planned to reduce the risk of chronic diseases such as diabetes, cardiovascular disease, hypertension, osteoarthritis at community level.

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