Pak J Med Res
Vol. 54, No. 1, 2015

Original Article

The Effect of Education and Consultancy Provided by Nurse on Main Components of Metabolic Syndrome in Women

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Received: 18 March 2014, **Accepted:** 10 March 2015, **Published:** 26 March 2015

Abstract

Background: The prevalence of metabolic syndrome is increasing day by day throughout the world. Cardiovascular disease are the primary clinical outcome of metabolic syndrome. Most individuals who develop cardiovascular disease have multiple risk factors.
Objective: To evaluate the effects of education and consultancy provided by the nurses to the women suffering from metabolic syndrome.
Study type, settings, duration: Randomised single blind controlled study, conducted in an obesity outpatient clinic in the department of endocrinology and metabolism, Istanbul from November, 2010 to October, 2011.
Subjects and Methods: A total 120 women with metabolic syndrome were randomly assigned to the intervention and control group. An education and consultancy program was given to the intervention group which comprised of reading materials and power-point presentations for three days. Individual consultancy was provided at the request of the patient. Data was collected using biochemical markers like fasting blood glucose, HbA1c, cholesterol, systolic and diastolic blood pressure and body composition measurements such as body weight, body fat and body mass index. Data was collected twice for ten months in the intervention and the control group and analyzed using Student t-tests, Mann Whitney U test, Wilcoxon and Chi-square test.
Results: In the intervention group, significant decrease was observed in fasting blood glucose, HbA1c, triglyceride, systolic and diastolic blood pressure, body weight, body mass index, visceral fat, total body fat and muscle, waist circumference, hip circumference, while an increase was observed in HDL-cholesterol. Individual consultancy was provided at the request of the patient. In the control group no significant change was seen between pre-assessment and pos-assessment parameters.
Conclusion: Education and consultancy provided by the nurses was effective in improving the basic parameters of metabolic syndrome in women.
Key words: Metabolic syndrome, women, metabolic syndrome basic components, education and consultancy.

Introduction

The metabolic syndrome (MetS) is a set of risk factors which has metabolic origins and is composed of risks related to the development of type II diabetes and cardiovascular disease (CVD)[1-3]. The relationship between the risk factors of MetS, type II diabetes, and CVD was first addressed in the 1970s. The MetS was named as Syndrome X by Gerald M. Reaven, which is a syndrome, composed of metabolic abnormalities. In the relevant literature, it is stated that the combination of various risk factors is considered to increase the risk of CVD development[4-6].

The prevalence of MetS is increasing day by day throughout the world and the diagnostic criteria of MetS differ according to the study population[7,8]. In the report of the National Health and Nutrition Research Survey (NHANES) III database, the prevalence of MetS was found to be 23.7% according to the Adult Treatment Panel (ATP) III criteria for the young adult population of the US. The prevalence rates of MetS in men (24%) and women (23.4%) are similar and increase with age[9]. The NHANES III MetS prevalence rate was calculated according to the ATP III diagnostic criteria and was found to be 34% in 2003-2006 in the young adult population of the US. It was stated that there was no significant difference regarding prevalence rates between men and women; prevalence rates increased with age and BMI and it differed among different ethnical groups[10].

The most comprehensive MetS prevalence study in Turkey is the Metabolic Syndrome Research (METSAR). In this study, the MetS frequency was found to be 33.9% in a Turkish adult population of 4259 people using the diagnostic criteria of the ATP III. The MetS prevalence was in women 39.6% and 28% in men. The results of the study showed that prevalence rates increased with age in both genders and there is no difference regarding the prevalence of MetS between rural and urban regions[11]. In the KARDIYOMETRE study, which was conducted by the Metabolic Syndrome Foundation of Turkey, data was collected from individuals who were older than 20 years of age and lived in 14 different regions in order to represent the adult population living in Turkey. In this study, the MetS prevalence according to the ATP III diagnostic criteria was found to be 35%. The MetS prevalence was 32.9% in men and 36% in women[12].

Today, the criteria accepted by the National Cholesterol Education Program NCEP-ATP III are used in order to diagnose MetS. The presence of at least three of the following symptoms is required in order to reach a diagnosis MetS: obesity, hypertriglyceridemia, low HDL-K values, hypertension and hyperglycemia[1].

The International Diabetes Federation (IDF) has stated that the relationship between abdominal obesity and MetS risk factors may differ among different ethnical groups and it has been suggested that the waist circumference of European men and women should be 80cm. According to this, the waist circumference of Asian men and women should be 90cm and 80cm, respectively. The fasting blood glucose should be 100mg/dl[1]. Abdominal obesity, hyperglycemia, dyslipidemia, hypertension[13], vascular inflammation, and prothrombotic situation[14] are also among the components of the MetS.

The main aim of MetS treatment is to support lifestyle changes related to nutrition and exercise habits[15]. The basic strategies aimed at achieving lifestyle changes should include a healthy diet, exercising, weight loss, and weight control as well as providing treatment for dyslipidemia, hyperglycemia, and hypertension[6].

Studies have shown that nutrition habits affect the increase in body weight and waist circumference. Minor lifestyle changes may occasionally lead to weight loss. Decreasing the daily calorie intake about 50 kcal and walking about 15-20 minutes every day could result in losing 5kg in a year or maintaining weight[16]. Waist circumference, which is an indicator of abdominal obesity, is one of the basic MetS components and could be decreased via lifestyle changes[17].

It was reported that after a weight control program for women, patients lost weight and maintained their weight after one year[18,19]. In another study, which investigated life style behaviors in women diagnosed with MetS, after a four-month education, positive changes were observed in biochemical parameters and physical activity levels, and average waist circumferences decreased from 115.1 ± 1.2cm to 110.7 ± 1.3cm[20].

The aim of this study was to evaluate the effects of education and consultancy provided by nurses on women diagnosed with MetS according to the diagnostic criteria of the ATP III.

Subjects and Methods

A randomised single blind controlled study was done in the department of Endocrinology and Metabolism in training and research hospital of Istanbul, from November, 2010 to October, 2011. The study population consisted of 120 women with MetS who were randomly assigned to the intervention and control group. Patients were chosen using the improbable incidental exampling method. A total of 60 patients were assigned to the intervention group and received education and 60 patients were assigned to the control group who did not receive any education. Metabolic syndrome was defined according to the ATP III criteria.

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The sample group was chosen randomly and included women who were diagnosed with MetS did not have any other condition or use any medication which may cause obesity, did not have a dose change during the last month for diabetes or hypertension, who were not pregnant, were older than 20 years of age, were literate, and had similar demographic characteristics. The individuals whose drug treatment method and dosage have greatly been changed for diabetes or hypertension treatment and new drug treatment been added by doctor have been left out of the scope and no one has used extra medication to lose weight.

Power analysis was done and it was determined that a sample size of 60 participants were required in order to achieve 80% Power and 0.05 significance level (a=0.005).

Data was collected regarding socio-demographic and disease related characteristics, biochemical parameters such as fasting blood glucose, HbA1c and cholesterol, systolic and diastolic blood pressure and body composition measurements such as body weight, body fat and body mask index of women with MetS. The biochemical parameters, systolic and diastolic blood pressure and body composition were assessed before and ten months after the education and consultancy program.

The height and weight of women with MetS were measured. The body mass indices (BMI) were calculated by dividing the patients' height square (m) into their weight (kg). Waist and hip circumferences were measured. Body fat was analyzed using the Body Composition Monitor.

Systolic and diastolic blood pressures were measured after the patient rested for at least 10 minutes. Blood was drawn from the right arm. Manual blood pressure monitoring was conducted. Heart rate was evaluated by counting 60 seconds on the right radial artery.

The results of biochemical blood tests such as triglyceride, HDL-L, LDL-K, fasting blood glucose, and HbA1c were obtained from file of patients which were done in the hospital laboratory and no extra cost was added to the patients.

The education was conducted via computer and power-point presentation which was done for three days to the intervention group. The education program included MetS specific information and information about self management behavior including diet, exercises, weight and blood pressure control. Evaluation was conducted at the end of the education and at the end of each session. The education manual book prepared by the researcher was given to the intervention group. After the completion of educational sessions, telephonic consultancy was provided to the cases. Telephone numbers of the patients were taken and a contact number was given to all patients. Individual consultancy was provided at the request of the patient. Personal consultancy sessions took place once a month but telephonic consultancy was provided when required by the patients.

The control group did not receive intervention other than routine procedures of outpatient clinic in pre test, but the same education and consultancy program which was offered to the intervention group was provided to the control group in post test in order to not to violate the right of being informed.

Data was analyzed using the NCSS (Number Cruncher Statistical System) 2007 and PASS (Power Analysis and Sample Size) 2008 Statistical Software (Utah, USA). In order to compare the intervention with the control group, chi-square and Mann Whitney U test were undertaken for dichotomous variables. Paired Samples t-test or Wilcoxon sign test was used to compare pre and post assessment data[21]. The statistically significant level was considered as $p<0.05$.

Ethical permission was obtained from the Marmara University, Graduate School of Health Sciences, Clinical Studies Preliminary Consideration Commission in Istanbul, Turkey and the Study Evaluation Commission. The purpose, method, and duration of the study were explained to each patient who agreed to participate in the study. It was stated that participation in the study was voluntary. In addition, patients signed an informed consent form developed by the researcher.

Results

The mean age of the patients was 49.98 ± 10.35 years (range 21 to 73 years). There was no significant differences between the intervention and the control group in relation to age, marital status, number of children, number of people living in the same house, educational status, and employment status (Table-1).

Hypothyroidism was significantly higher in the intervention than the control group ($p<0.05$) while there was no significant difference between the intervention and the control group in smoking and alcohol consumption.

MetS usually have either diabetes or hypertension; the frequency of hypertension in male first degree relatives was significantly higher in the intervention than the control group ($p<0.01$), whereas the frequency of diabetes in male first degree relatives was significantly higher in the control group than the intervention ($p<0.05$).

In pre-assessment, there were no significant difference according to height, weight, waist circumference, hip circumference, waist-hip rate, BMI, total body fat percentage, and visceral fat percentage measurements between the intervention and the control group (Table-2).

The height, weight, waist circumference, hip circumference, waist-hip rate, BMI, total body fat percentage and visceral fat percentage measurements of the intervention group were significantly lower in post-assessment than the pre-assessment (p<0.05 and p<0.01) whereas the height, weight, waist circumference, hip circumference, waist-hip rate, BMI, total body fat percentage and visceral fat percentage measurements of the control group did not show any significant difference in post-test than the pre-assessment. The total muscle percentage of the intervention group was significantly lower in post-assessment than the pre-assessment (p<0.01) whereas the total muscle percentage of the control group was not significantly different in post-assessment than the pre-assessment (p>0.05) (Table-2).

Table 1: Comparison of demographic and disease characteristics in the intervention and the control groups.

Characteristics		*Intervention Group (n = 60)*		*Control Group (n = 60)*		*Significance*
		n	*%*	*n*	*%*	
Marital status	Married	49	81.7	51	85	$X^2 = 0.240$
	Single	11	18.3	9	15	$p = 0.624$
Number of children	None	3	5	5	8.3	
	1 child	15	25	6	10	$X^2 = 6.124$
	2 children	22	36.7	24	40	$p = 0.190$
	3 children	12	20	11	18.3	
	≥ 4 children	8	13.3	14	23.3	
Number of people living in the house	≤ 2 people	14	23.3	12	20	
	3 people	14	23.3	19	31.7	$X^2 = 4.687$
	4 people	25	41.7	16	26.7	$p = 0.196$
	≥ 5 persons	7	11.7	13	21.7	
Educational status	Elementary	32	53.3	42	70	$X^2 = 3.525$
	High S. School University	28	46.7	18	30	p =0.060
Employment status	Housewife	56	93.3	59	98.3	$X^2 = 1.878$
	Employed	4	6.7	1	1.7	$p = 0.171$
Co-morbid chronic disease	Yes	48	80	51	85	$X^2 = 0.471$
	No	12	20	9	15	$p = 0.632$
Continuous medication treatment	Yes	47	78.3	45	75	$X^2 = 0.186$
	No	13	21.7	15	25	$p = 0.666$

Table 2: Comparison of body composition in the intervention and the control groups in pre-assessment and post-assessment. (N = 120)

		Pre-assessment Mean ± SD	*Post-assessment Mean ± SD*	*Significance*
Body weight (kg)	Intervention Group	84.84 ± 13.36	80.82 ± 13.56	t = 7.355, $p = 0.001$**
	Control Group	88.03 ± 15.84	87.79 ± 15.80	$t_2 = 0.639$, $p = 0.525$
	Significance	t= 1.192, $p = 0.235$	t= 2.591, $p = 0.011$*	
BMI (kg/m^2)	Intervention Group	33.32 ± 5.14	31.71 ± 5.05	t= 6.853, $p = 0.001$**
	Control Group	35.13 ± 6.42	35.05 ± 6.49	$t_2 = 0.505$, $p = 0.616$
	Significance	t= 1.704, $p = 0.091$	t = 3.146, $p = 0.002$**	
Waist circumference (cm)	Intervention Group	99.76 ± 9.73	96.97 ± 9.80	t = 9.657, $p = 0.001$**
	Control Group	101.88 ± 10.42	101.71 ± 10.36	t = 0.747, $p = 0.458$
	Significance	t = 1.150, $p = 0.253$	t = 2.57, $p = 0.011$*	
Hip circum. (cm)	Intervention Group	117.06 ± 10.90	114.91 ± 10.79	t = 4.095, $p = 0.001$**
	Control Group	120.67 ± 11.89	120.46 ± 11.92	t= 1.022, $p = 0.311$
	Significance	t = 1.72, $p = 0.087$	t = 2.673, $p = 0$ .009**	
Waist/ hip rate	Intervention Group	0.85 ± 0.04	0.84 ± 0.05	t = 2.016, $p = 0.048$*
	Control Group	0.84 ± 0.05	0.85 ± 0.05	t = 0.534, $p = 0.596$
	Significance	t = 0.739, $p = 0.461$	t = 0.10, $p = 0.915$	
Total body fat percentage (%)	Intervention Group	46.75 ± 7.89	44.05 ± 5.63	t =3.865, $p = 0.001$**
	Control Group	46.44 ± 6.60	46.75 ± 6.97	t = 1.402, $p = 0.166$
	Significance	t = 0.240, $p = 0.811$	t = 2.330, $p = 0.022$*	
Visceral fat percentage (%)	Intervention Group	10.10 ± 2.47	9.81 ± 2.43	t = 3.068, $p = 0.003$**
	Control Group	10.77 ± 2.79	10.87 ± 2.84	t = 1.351, $p = 0.182$
	Significance	t = 1.387, $p = 0.168$	t = 2.179, $p = 0.031$*	
Total body muscle percentage (%)	Intervention Group	23.95 ± 2.73	24.54 ± 2.95	t = 2.970, $p = 0.004$**
	Control Group	24.19 ± 3.66	24.22 ± 3.59	t = 0.221, $p = 0.826$
	Significance	t = 0.41, $p = 0.681$	t = 0.53, $p = 0.591$	

*Note: *p<0.05, **p<0.01*

Table 3: Comparison of biochemical parameters and blood pressure levels in the intervention and the control groups in pre-assessment and post-assessment. (N = 120)

Blood tests Normal values		*Pre-assessment Mean ± SD*	*Post-assessment Mean ± SD*	*Significance*
Fasting Blood Glucose (70-106mg/dl)	Intervention Group	114.96 ± 42.28	108.25 ± 39.60	t = 2.311 *p* = 0.024*
	Control Group	120.61 ± 46.22	112.27 ± 36.82	t = 1.872 *p* = 0.066
	Significance	t = 0.669 *p* = 0.505	t = 0.575 *p* = 0.566	
Total Cholesterol (100-200 mg/dl)	Intervention Group	222.28 ± 45.14	215.03 ± 41.44	t= 1.308 *p* = 0.196
	Control Group	197.73 ± 48.00	197.61 ± 41.22	t = 0.024 *p* = 0.981
	Significance	t = 2.886 *p* = 0.005**	t = 2.308 *p* = 0.023*	
HDL – K (45-65 mg/dl)	Intervention Group	48.95 ± 11.71	51.47 ± 10.04	t = 2.953 *p* = 0.005**
	Control Group	50.91 ± 9.71	52.28 ± 9.23	t = 1.649 *p* = 0.104
	Significance	t = 1.001 *p* = 0.319	t = 0.464 *p* = 0.644	
HbA1c (%4-6)	Intervention Group	6.13 ± 1.12	6.01 ± 1.01	t = 2.494 *p* = 0.015*
	Control Group	6.56 ± 1.32	6.34 ± 1.18	t = 1.971 *p* = 0.048*
	Significance	t = 1.898 *p* = 0.060	t = 1.633 *p* = 0.105	
Triglyceride(60-150mg/dl)	Intervention Group	196.73 ± 145.9	167.62 ± 109.8	Z = 2.578 *p* = 0.010*
	Control Group	140.80 ± 61.51	131.15 ± 46.73	Z = 1.751 *p* = 0.080
	Significance	U = 1234.50 *p* = 0.003**	U:1443.50 *p* = 0.061	
Systolic BP (mm/Hg)	Intervention Group	121.0 ± 16.84	116.83 ± 13.96	t = 3.325 *p* = 0.002**
	Control Group	121.58 ± 16.01	123.75 ± 12.16	t = 1.962 *p* = 0.055
	Significance	t = 0.194 *p* = 0.846	t = 2.893 *p* = 0.005**	
Diastolic BP (mm/Hg)	Intervention Group	74.41 ± 11.46	72.08 ± 9.71	t = 2.192 *p* = 0.005**
	Control Group	75.58 ± 9.74	75.88 ± 8.58	T = 0.481 *p* = 0.632
	Significance	t = 0.601 *p* = 0.549	t = 2.272 *p* = 0.025*	

*Note: *p<0.05 **p<0.01*

In pre-assessment, there were no significant differences according to the systolic and diastolic blood pressure between the intervention and the control group ($p>0.05$). The systolic and diastolic blood pressure were significantly lower in post-assessment than the pre-assessment in the intervention group ($p<0.01$), whereas the systolic and diastolic blood pressure were not significantly different between pre-assessment and post-assessment in the control group ($p>0.05$) (Table-3).

In pre-assessment, there were no significant differences between the intervention and the control group regarding to the fasting blood glucose, HDL-cholesterol and HbA1c levels ($p>0.05$) whereas there was significant difference between intervention and the control group regarding to the total cholesterol and triglyceride levels ($p<0.01$) (Table-3).

In the intervention group, there were significant differences between pre-assessment and post-assessment according to the fasting blood glucose, HDL-cholesterol, HbA1c and triglyceride levels (Table-3).

In the control group, there were no significant differences between pre-assessment and post-assessment according to the fasting blood glucose, total cholesterol, HDL-cholesterol and triglyceride levels ($p>0.05$) whereas there was significant difference between pre-assessment and post-assessment according to the HbA1c level ($p<0.05$) (Table-3).

Discussion

In our study, the mean age of the intervention group was found to be 50.41±9.62 years and 49.55±11.09 years in the control group. Increased BMI, waist circumference and age are identified as MetS risk factors[22,23]. In studies conducted with women diagnosed with MetS, mean ages were higher compared to our study[24,25]. However, in Turkish studies, mean ages of women diagnosed with MetS were similar to our finding[12,26].

The role of genetic factors on the occurrence of basic MetS components is not clear. However, in some studies, it is assumed that genetic factors have an effect on the pathogenesis of MetS[13,27,28]. In the present study, history of obesity, diabetes, hypertension, and CVD in first degree relatives were questioned in order to analyze women's genetic tendency to MetS. When we examined the presence of diabetes, hypertension, and CVD in first degree relatives of the patients; it was found that at least one of the above mentioned health issues were present in 62.5% of the first degree male relatives and in 90% of the first degree female relatives.

Smoking has a major effect on CVD risk and modifiable MetS risk factors in individuals whose BMI is between 25-29 kg/m^2 [29]. Therefore, individuals with MetS who carry the risk of CVD should quit smoking[30].

Smoking rates are growing day by day in Turkey among women and the rate of smoking women is higher in urban regions than rural regions[31]. In our study, the smoking individuals' rate in the experimental group was 13.3% and 11.7% in the control group.

It is declared that the waist circumference, which is used in order to determine abdominal obesity, is one of the basic components of metabolic syndrome, and it may be decreased via lifestyle changes[18]. In addition, BMI is an important indicator in determining the risk of CVD[12].

The purpose of interventions which regulate diet and exercise is to maintain the loss of fat and to prevent the mass of muscle. Decreasing the energy gained from food about 500 kcals may cause approximately 8% weight loss[32]. Controlling energy intake via exercise would lead to greater weight loss[32,33]. The findings of our study have shown that weight loss in the intervention group was higher than the control group and that weight loss has a positive effect on visceral fat percentage and total muscle mass.

In the post-assessment measurements, the decrease of composition parameters in the intervention group, such as BMI, body fat percentage and waist circumference supports our hypothesis that women with MetS who receive education and consultancy provided by nurse have lower body composition values. Our study findings similar to other relevant studies[19,20,22,34,35].

Being overweight is one of the modifiable hypertension risk factors and it constitutes one of the basic components of MetS[36]. In our study, it was observed that 65.7% of the patients in both groups were diagnosed with hypertension and received pharmacological treatment and the average systolic and diastolic blood pressure levels were determined to be within normal limits in both groups.

It is known that life style changes and weight loss have positive effects on high blood pressure as well as other MetS components[37]. The positive effects of education and consultancy provided by nurse on systolic and diastolic blood pressure and heart rate were demonstrated in our study. Our study findings are similar to other studies which show the relationship between weight loss and blood pressure[38].

In a study conducted for determining the control of blood glucose levels in Turkish adults with Type II diabetes who are under treatment, it was found that 64% of the patients had a HbA1c level of 7% and the general average was 8%. The patients have received treatment for seven years. 42.7% of the patients were determined as obese and 39.7% were determined as overweight. The dyslipidemia and hypertension frequencies were determined as 76.9% and 88.3%, respectively[12]. As we see in these results, MetS may have one or more diseases constituted on a common basis; therefore MetS may deteriorate the treatment process.

In the current study, fasting blood glucose decreased in the intervention and control group in post-assessment. This decrease was found to be significant in the intervention, but not in the control group. This supports our hypotheses regarding the positive effects of exercise, lifestyle changes, dieting on fasting plasma glucose in patients with MetS[38].

Adopting a healthy life style plays an important role in controlling the blood lipids of patients with MetS[24,39]. In the studies which aim to control dyslipidemia in individuals with MetS, it was found that there was a decrease in triglyceride levels and an increase in HDL-K levels[20,34,40]. In our study, education and consultancy provided by nurse had positive effects on dyslipidemia.

The present study evaluated the effects of education and consultancy provided by nurse on the basic components of MetS in women who are diagnosed with MetS according to the Adult Treatment Panel- ATPIII diagnostic criteria. The results of this study indicate that education and consultancy provided by nurse is an effective method for controlling the basic components of MetS with the growing rates of MetS throughout the world. MetS and associated health problems can be prevented by eliminating the risk factors and adopting healthy lifestyle behaviors.

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