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ORIGINAL ARTICLE

Community based peer supported weight loss intervention on women with overweight and obesity

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Abstract

Objective: The purpose of this study was to assess the success of the new peer-led weight loss community intervention model in women aged 18-64.

Methods: Women leaders in the community (n = 11) were identified to supervise and monitor their target group of women during the intervention which included a balanced diet and regular physical activity program. Initially, all women aged 18–64 in the district (n = 655) were screened and 396 were found to have a BMI > 25.0. Of these, 137 volunteered to participate in the program. 86.9% of the women completed the 3rd month, and 78.1% completed the 6th month of the intervention. Univariate (Paired t-test and Wilcoxon signed rank test for dependent groups; Student's t test, Mann–Whitney U test, Kruskal–Wallis, Chi-square, and Fisher's exact test for independent groups) and Multiple Linear Regression analyses were conducted in the study. Type 1 error limit was accepted as 0.05 in the analyses.

Results: Significant improvements were observed in the body weight of the participants in the 3rd (-1.1±2.5 kg) month of the intervention ($p<0.05$). At 3rd and 6th months of the intervention, 10.9% and 13.1% of women lost at least 5% of their weight, while 8.4% and 11.2% of women jumped to a better BMI category, respectively.

Conclusion: The exercise program implemented (regardless of covariate variables) was effective on the weight loss. Community-based peer-led obesity interventions are challenging but promising.

Keywords: Obesity, Prevention And Control, Women's Health, Residence Characterictics

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INTRODUCTION

Obesity is the second most common cause of preventable deaths globally following smoking.[1] In 2016, 13.1% of adults globally were obese, increased from 8.7% in 2000. Unlike many other health risks, the prevalence of obesity were higher among adult women than men.[2] The obesity prevalence among Turkish women is quite high[3] and Turkey is ranking first among European countries in women obesity.[4] Lifelong multidisciplinary treatment, including behavioral therapy, is required for the successful treatment of obesity.[5] Oxford dictionary defines "peer" as a person who is the same age or who has the same social status.[6]

Peer-support approaches have increasingly been used throughout the world as a health promotion strategy to bring people to address their health and social problems.[7,8]

Behavioral change therapy cannot be successful unless adequate social support is provided by relatives and close friends/ peers. Community based peer-led obesity interventions are scarcer in the literature than peer-led interventions that have been carried out in a clinical context.[9-12] Peer-led education is another non-didactic approach to learning that has been used in training health care professionals and students in a number of areas.[13,14]

Community interventions to address risk factors for Noncommunicable Diseases (NCD) are of particular importance within public health policies. While the participants in clinical intervention studies who have already reached health services and have more intention to control their weight, field interventions on the other hand, have mostly been conducted on people who are less eager to control their weight and who may have difficulties to accessing to health services. Therefore, the main difference between community based and clinic-based trials is the target populations' accessibility to the health services which affects the success of the intervention. In addition, field interventions should be simple and community-focused enough to be integrated into routine primary health care (PHC) in all regions of a country .[15]

This study aimed to demonstrate the effectiveness of the peer-led obesity intervention model in women. The applicability of this model in the primary health care setting at the community level was also demonstrated. Therefore, the purpose of our research was to reduce Body Mass Index (BMI), fat ratio, and fat amount of the targeted women through the support of their peers (leading women) by modifying nutrition intake and increasing physical activity in a rural community.

METHODS

Study design, study district and Subjects

This quasi-experimental community-based field intervention was conducted in a rural district (Karaağaçlı) of Manisa province in Turkey between April 2018 and April 2019. Manisa province, where agricultural activities are common, located in the west of Turkey which is more developed than rest of the country. The Karaağaçlı population consists of the local indigenous farmers and the population that emigrated from the Bulgaria with two separate waves of migration (1945 and 1989). The entire population living in this district receives Primary Care service from a single Family Health Center (FHC).

We named the peer-led training intervention model used in this study as "Leading Woman Model (LWM)". The study consisted of two consecutive steps: 1- Body weight screening and 2- Peer-led Field intervention.

In the first stage, all women (n=655) between the ages of 18-64 registered in the Family Health Center for were screened for height and weight. Eighteen women who were pregnant at the time were excluded from screening. 396 women who were screened as overweight or obese were invited to participate in the intervention study and 137 (38.4%) of them (BMI range of 25.00 to 39.99) volunteered in the study. The flow diagram of the study sample is presented in Figure 1.

Inclusion and exclusion criteria

The inclusion criteria were: 1-Having a BMI in the range of 25.00–39.99 kg/sqm 2- accepting to participate in the study 3- cognitive competence.

Exclusion criteria were pregnancy, breastfeeding, physical (including cancer, post-myocardial infarct, multiple sclerosis, and chronic neurologic diseases etc.) or intellectual (cognitive incompetence and having a psychotic disorder etc.) disability, morbid obesity (BMI ≥40.00 kg/sqm), and tachycardia.

Leading women

Leading Women (peer leaders) (n=12) were chosen from the community to act as trustworthy mentors and guides for the women. They were identified by a panel of community professionals including local teachers, PHC physician, nurses, and the local pharmacists. During the selection of peer leaders, characteristics such as being able to establish good interpersonal relationships, including listening skills, being someone who is accepted and respected by the target women, being able to exhibit a non-judgmental attitude, having the self-confidence and potential required for leadership, having the time, energy and desire to volunteer, and having the potential to be an exemplary individual for their peers were taken into consideration. Of the 12 women who were identified as peer leaders, 11 were overweight or obese and included in the intervention group as well. The mean age of the peer leaders was 43.5±9.6; 50.0% of this group were primary, 33.3% secondary, and 16.7% high-school graduates.

Assigning the volunteer women to the peer-leader groups

Each of the 12 peer leaders were asked to select women with whom they had good communication and social contact in daily life, among volunteers. It was ensured that the volunteer women were also willing to participate in the leader women's intervention group which they were assigned to. The range of the number of volunteer women assigned to a leading woman was 5 to 17.

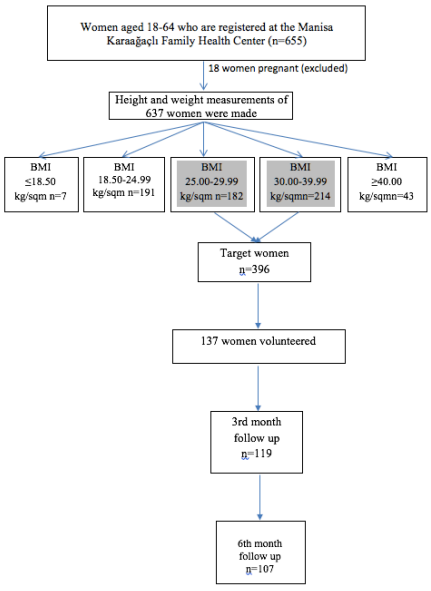

Figure 1. Sampling flow diagram

Training of the peer-leaders

Initially, the leading women were given hands-on training for 3 days on nutrition, obesity (nutrition facts, obesity as a risk factor and accompanying health problems and prevention of obesity), and physical activity (ideal duration, methods, indoor and outdoor models etc.) by the professional health staff of public health authority (a dietitian, the PHC physician and the nurse) and public health and sports medicine specialists of the Manisa Celal Bayar University (MCBU).

Baseline assessments of the volunteers

Baseline measurements of weight and height, waist and hip circumference, biometric body analyses (body fat mass, body fat ratio, trunk fat mass, trunk fat ratio, body muscle mass) were registered and International Physical Activity Questionnaire (IPAQ), Attitudes Towards Obese People scale (ATOP) and Hospital Anxiety and Depression Scale (HADS) were applied to each women.

Intervention

The intervention that underpins this study is the motivation created by peer leaders on women. The two main tasks of the leading women throughout the intervention were: 1) the communications (face to face and/or via Whats-App groups) between the leading women and the intervention group focused on their diets and, 2) organizing regular (at least once a week) exercise sessions (daily outdoor walks and physical exercises) in the neighborhood exercise and physical activity area held by the municipality. In addition, during the research, monthly motivation meetings were held with the leading women by the researchers and suggestions were made when necessary.

Assessment of the outcomes of the intervention

At the 3rd month of intervention, we measured the waist and hip circumference and weight of the volunteer women and applied the IPAQ and HADS. At the 6th month of intervention we repeated the 3rd month assessments added by biometric body analyses.

The outcomes (dependent variables) of the intervention were classified into two groups:

Weight and BMI differences

Mean body weight, waist and hip circumference differences (between baseline–3rd month–6th month of the intervention)

5% weight loss (between baseline weight loss and 6th month weight loss)

BMI category reduction: from BMI ≥25.00 (overweight/obese) to BMI <25.00 or from BMI ≥30.00 (obese) to BMI = 25.00–29.99 (between baseline–6th month of the intervention)

*Mean difference in biometric body assessments (*between *baseline and 6th month of the intervention)*

Body fat mass (trunk plus extremities)

Body fat ratio (trunk plus extremities)

Trunk fat mass

Trunk fat ratio

Body muscle mass (trunk plus extremities)

Assessment tools

Anthropometric and biometric assessments

The measurements were done in the PHC center by the researchers between June 2018 and November 2018. Body weight, body fat mass, body fat ratio, trunk fat mass, trunk fat ratio, body muscle mass, and body fat-free

mass, were recorded using a bioelectrical impedance analyzer (InBody 230). A pedometer was distributed to each participant by province health directorate during the intervention period just for motivation of the volunteer women to exercise. No valid pedometer data could be obtained or recorded.

Questionnaires

The baseline sociodemographic questionnaire includes characteristics such as age, level of education, marital status, working status, family type, health insurance, migration status and medical conditions. Baseline questionnaire battery also included Attitudes Towards Obese People scale (ATOP), International Physical Activity Questionnaire (IPAQ) and Hospital Anxiety and Depression Scale (HADS).

ATOP was used in order to measure the attitudes of women towards obesity before the onset of intervention. ATOP score was treated as a continuous variable in the analyses. No cut off score value was suggested for ATOP, the higher the score, the better the attitude towards people having obesity.[16,17]

IPAQ was included to assess the women's level of physical activity. An increase in IPAQ score indicates an increase in physical activity. IPAQ classifies respondents into three Metabolic Equivalent of Task (MET) score categories (high, moderate, and low).[18,19]

HADS was developed to evaluate the depressive mood of the women. We used only the "depression subscale" of the HADS which has a cut-off value of >7.0 indicating depressive mood.[20]

The HADS and IPAQ forms were filled in at baseline and at the 3rd and 6th month follow-up period, whereas ATOP was only tested at baseline.

Statistical analysis

The dependent variables of this study were weight loss (average weight loss, at least 5% weight loss, and BMI category decrease) and biometric variables (body muscle mass, body fat mass, body fat ratio, trunk fat mass, trunk fat ratio).The main independent variable of the study is "physical activity", whereas sociodemographic variables, attitude to obesity, baseline depressive mood; health and body image perception, family history of obesity, previous weight loss attempts, previous physical activity practices, fertility history, and having any chronic illness were treated as covariates.

Paired t-test, Wilcoxon signed rank and Friedman test were conducted for comparisons of dependent groups analyses; Student's t test, Mann–Whitney U test, Kruskal–Wallis test were used for comparisons of independent groups, where appropriate in the univariate analyses. Cochrane's Q analyses were employed for repeated measures -more than two – in dichotomous variables. Bonferroni test was used in post hoc comparisons and Bonferroni correction has been made (*critical limit: p <0.017)*. A Multiple Linear Regression model was applied to address the multiple predictive variables on weight loss. Normality analysis was performed with Shapiro-wilk test and when the data did not show a normal distribution, median comparisons were used in numerical data. The analyses were performed by SPSS 23.0 statistical package and type 1 error limit was accepted as 0.05.

Ethical issues and funding

Written informed consents were obtained

from the volunteer women in this intervention. This study was approved by the MCBU Ethics Committee, dated 21.06.2017, issue no 25160. It was granted by the MCBU Project Grant Number 2018-013. The authors declare no conflicts of interest. It is written in accordance with the Declaration of Helsinki. The full text of the article was published online at Research Square platform, without peer review.[21]

RESULTS

The mean age of the intervention group was 42.91±12.00 (IQR= 33.00-54.00) and 41.6% was primary school, and 56.2% was secondary and higher school graduates. The other sociodemographic and health characteristics of the study group are shown in Table 1.

Table 1. Sociodemographic characteristics of the participants

Variables		n	(%)
Age (years, mean ± sd)		42.91 ± 12.00	
Marital status	Married	125	91.3
	Single	4	2.9
	Widowed	8	5.8
Educational status	Illiterate	3	2.2
	Primary school	57	41.6
	Secondary school	44	32.1
	High school and further	33	24.1
Work status	Housewife	80	58.4
	Working	45	32.8
	Retired	12	8,8
Family type	Nuclear family	102	74.5
	Immediate family	35	25.5
Having any health insurance coverage?	Yes	122	89.1
	No	15	10.9
Migration status	Immigrant	46	33,6
	Native	91	66,4
Having any chronic illness?	Yes	82	59.9
	No	55	40.1
BMI index category at baseline	25.0-29.99 (overweight)	72	52.6
	30.0-34.99 (grade I obese)	40	29.2
	35.0-39.99 (grade II obese)	25	18.2
Total		137	100.0

Of the study group, 72.2% perceived themselves to be overweight/obese and just 18.3% were satisfied about their body weight before the intervention. Half of the women (49.6%) had at least one attempt to lose weight previously. Of the women, 86.9% (n=119) continued the intervention for 3 months and 78.1% (n=107) for 6 months.

When compared to the baseline measurements, 71.0% and 58.9% of the women have lost weight at the 3rd and 6th months of the intervention, respectively. Compared to baseline measurements, the mean weight loss was 1.25kg. and median weight loss was 1.0 kg at the 3rd month of intervention ($p < 0.001$), whereas mean and median weight loss at the 6th month of intervention was 1.13kg. and 0.50 kg respectively ($p = 0.037$). Statistically significant weight loss was found between baseline and third month and between baseline and sixth month, but weight loss between 3rd and 6th months was not found significant (table 2).

According to the results of biometric body analysis, at the end of the 6-month of intervention, there was a statistically significant decrease in all body fat indicators compared to the baseline, whereas a significant increase in body muscle mass was measured ($p<0.05$). The mean body muscle mass increase was 0.1 ± 4.5 kg ($p = 0.021$), and the mean body fat mass decrease was 1.7 ± 4.0 kg ($p < 0.001$) after 6 month of intervention (Table 2).

Physical activity of the participants significantly increased during the first three month of the intervention and decreased between 3rd and 6th month. While the mean MET score was 867.2±798.5 at the beginning of the intervention, it increased

to 1445.4±1444.6 at the 3rd month of the intervention and, decreased to 660.1±749.1 at the 6th month of intervention (p<0.001) (Table 2).

Table 2. Changes in Anthropometric, Biometric and MET score Measurements of the Study Group throughout the Intervention

	Baseline[1] (mean±sd)	3rd month[2] (mean±sd)	6th month[3] (mean±sd)	p	Post hoc***
Anthropometric outcomes					
Body weight	79.0±11.1	77.8±10.5	77.9±10.7	**0.001***	1>(2=3)
Waist circumference	94.6±9.2	93.6±9.4	93.3±10.3	**<0.001***	1>(2=3)
Hip circumference (median,min-max)	114.0±8.7 (114.0, 96.0-133.0)	112.7±8.4 (113.0, 96.0-128.0)	112.0±8.7 (112.0, 96.0-132.0)	**<0.001****	1>(2=3)
Biometric outcomes (mean differences)					
Body muscle mass (kg)	25.7 ± 3.2	-	26.1 ± 3.4	**<0.05****	
Body fat mass (kg)	32.4 ± 8.5	-	30.6 ± 8.4	**<0.001** *****	
Body fat ratio (%)	40.5 ± 5.9	-	38.8 ± 6.6	**<0.001** *****	
Trunk fat mass (kg)	16.7 ± 3.9	-	16.0 ± 4.1	**<0.05****	
Trunk fat ratio (%)	41.3 ± 4.9	-	39.8 ± 5.7	**<0.001** *****	
MET score**** **(mean±sd)**	867.2±798.5	1445.4±1444.6	660.1±749.1	<0.001*	2>(1=3)

* Analysis of variance was used for repeated measurements (Greenhouse-Geisser p-value taken) , **Friedman test was used , *** Post hoc; Bonferroni correction has been made; critical limit: p <0.017, **** Wilcoxon signed rank test was used, ***** Paired t test was used, ******Calculated (weekly) according to the International Physical Activity Assessment Questionnaire (IPAQ).

As a secondary outcome, the frequency of depressive mood (measured by the HADS) decreased significantly during the intervention periods especially in the first three months. The rate of depressive mood were %37.4 at baseline; %18.7 at the 3rd month and %15.9 at the 6th month of intervention (p<0.001).

Among the participants, the proportion of those who lost at least 5% of their weight was 10.9% in the first 3rd month period and 9.3% in the second 3rd month period. At the end of the whole intervention (6th month of intervention), 13.1% of the participants have lost 5% of their body weight. Additionally, the percentage of the women having reduction of their BMI category –was 8.4% in the first 3 months and 11.2% during the whole intervention period (Table 3).

Table 3. Improvements in weight loss in 3rd and 6th month of the intervention among women

	Baseline to 3rd month of the intervention (n = 119)	Baseline to 6th month of the intervention (n = 107)
Weight loss of at least 5%	10.9%	13.1%
BMI category reduction*	8.4%	11.2%

*BMI category reduction: from BMI ≥25.00 (overweight/obese) to BMI <25.00 or from BMI ≥30.00 (obese) to BMI = 25.00–29.99 (between baseline–6th month of the intervention

According to the 3rd month results of the intervention; when anthropometric changes and the factors affecting them are evaluated together, the factors that cause average weight loss were employment status, health insurance coverage, residence/immigration status and education level of the spouse. (Table 4).

Table 4. Univariate analyses results for weight difference in the 3rd month of intervention

Variables	Median weight difference (0–3 month) (min, max)		p-value
Age	18–34	-0.7 (3.2, -5.7)	0.987**
	35–49	-0.9 (5.1, -13.0)	
	50–64	-1.2 (1.7, -5.6)	
Educational status	Primary school and below	-8.8 (3.2, -13.0)	0.871*
	Secondary school and above	-1.2 (5.1, -7.9)	
Work status	Employed	-0.4 (5.1, -13.0)	**0.041***
	Unemployed	-1.2 (2.6, -7.9)	
Have any health insurance coverage?	Yes	-1.2 (5.1, -13.0)	**0.012***
	No	0.6 (2.7, -4.0)	
Migration status	Native	-1.3 (5.1, -13.0)	**0.019***
	Bulgarian migrant	-0.40 (3.20, -5.30)	
Spouse's education	Primary school and below	-1.4 (5.1, -5.6)	**0.048***
	Secondary school and above	-0.4 (3.2, -13.0)	
Baseline BMI	Obese	-1.2 (3.2, -13.0)	0.317*
	Overweight	-0.7 (5.1, -5.6)	
Have any another overweight person in the household?	Yes	-1.2 (5.1, -7.9)	0.757*
	No	-0.8 (2.4, -13.0)	
Weight satisfaction	Not satisfied / undecided	-1.0 (5.1, -13.0)	0.817*
	Satisfied	-1.0 (2.6, -5.1)	
Have any weight loss attempt before intervention?	Yes	-0.8 (5.1, -13.0)	0.715*
	No	-1.2 (2.6, -7.9)	
Have any daily TV watching habit?	Yes	-1.2 (5.1, -13.0)	0.383*
	No	-0.4 (3.2, -6.5)	
Have any risk of depression before intervention?	Yes	-1.3 (2.6, -7.9)	0.427*
	No	-0.7 (5.1, -13.0)	
MET Categories* **	Inactive	-0.7 (5.1, -4.5)	0.067**
	Minimally active	-1.2 (3.2, -13.0)	
	Active	-2.4 (0.6, -5.3)	

*Mann Whitney-U; **Kruskal Wallis Anova ;*** IPAQ

The linear regression results showed that weight loss at the 3rd month of the intervention was greater in locals than of those who had migrate, those with health insurance compared to those without health insurance, and those who exercised effectively during this period than those who did not (Table 5).

Table 5. Linear regression results for weight loss between baseline and 3rd month of intervention (backward reduced final model)*

	Standardize beta	t değeri	p değeri	VIF**
Constant		0,993	0.323	
Migration status	-0.177	-2.002	0.048	1.012
Health insurance	0.175	1.985	0.050	1.013
MET score difference (0-3 months)	-0.213	-2.425	0.017	1.002

*Adjusted by: Age, working status, health insurance coverage, Attitudes Towards Obese People scale score, Hospital Anxiety and Depression Scale score, migration status, MET score difference

**Variance Inflating Factor

DISCUSSION

This weight-loss intervention had promising results in the first 3 months of intervention, however the weight loss indicators (either any weight loss or at least 5% weight loss or standard BMI index category reduction) of our study was less than other similar studies.

Mean weight loss during the first three months of the intervention was 1.14 ± 2.51 kg (median= 1.0 kg). Different intervention studies reported different results, such as the mean weight loss was 2.8 kg in a study conducted in an urban district in Turkey[22]; 2.1 kg weight loss in a study in Japan[23] intervention by telephone and mails, known as 'tele-care' and 6.4 lbs (2.9 kg) weight loss in a study in the USA[24] were found, as all were more than the weight loss achieved in our study.

In other studies that have used "losing at least 5% of body weight" as the weight loss criterion, which is a more competent indicator than any weight loss, seem to show more effective results than our study. About more than one in 10 women showed 5% or higher weight loss at the end of the 3rd month of the intervention in our study whereas the rate of individuals who have lost at least 5% their body weight varied between 20.0% and 24.7% in other previous intervention studies, indicating a better success rate than our results.[22,24,25] Additionally, BMI index category reduction is another valuable outcome for the assessment of success in weight loss interventions. The percentage of women whose BMI category reduced in the first 3 months of the intervention was 8.4%, and it was 11.2% for the whole 6 month of intervention period. BMI category reduction rate ranged between 23.6% and 27.9% in other intervention studies [22,26,27] and these are obviously higher than our study findings. On the other hand, the rate of BMI category reduction was found to be about 6.5% in a recent rural field obesity intervention in Turkey based on only a public mass education campaign. This might provide good evidence of the usefulness of our peer-based intervention in a rural district.[28]

In contrary to our study, all these studies were carried out on urban populations, therefore the higher weight loss figures in these studies, compared to our study may be attributed to either higher level of education of the urban women or the higher willingness of the urban women to be involved in the intervention than the women in our study. Also, almost all the previous interventions cited here were all facility-based that are concentrated on obesity control and weight loss, which people had applied on their free will and without secondary propaganda, but the women in our study were asked and invited to participate ~~to~~ in the intervention rather than searching and applying to the PHC centers voluntarily. Our intervention program distinguishes by its specific peer-based support method carried out in a rural district, so cultural codes are highly to be effective and determining for the behaviors of the participated women, especially in rural populations. Indeed, an Australian study reported that, gender norms and expectations, which are more decisive in rural populations are shaping and limiting the exercise behavior.[29]

The higher weight loss figures observed in these studies compared to ours may be attributed to specific difficulties of our field intervention. We can explain this inconsistency, as the women in our study did not have a pre-intervention demand for weight loss, whereas in the majority of the

previous obesity interventions, a person having obesity would deliberately go to a clinic to lose weight. Therefore, the observed success of the intervention—although not as good as an facility-based intervention—is more realistic, and the results can be more generalizable.

The improvements of the anthropometric measurements in the first three months of the intervention were significantly better than the second three months of intervention. The intervention was started in the summer months when people were more physically active in the field work (e.g., vineyard farming activities), and lasted until the end of fall when heavy rains start. Therefore, the decrease in weight loss in the second three month period of the intervention might be attributed to the decrease of physical activity during this period.

Biometric body analyses – as a second group of outcome of this study- were performed at the beginning and repeated at the 6th month of follow-up. The reason why these analyses were not performed at the 3rd month is that significant changes in biometric parameters are expected at earliest at the 6th month of follow-up .

The predictors of weight loss in this study were having higher education, having a low-educated spouse, being a local and being unemployed. It was demonstrated in several obesity interventions that higher educated people would benefit from community-based health promotion programs more than others.[30,31]

There might be several reasons for this difference. First, migration itself is associated with overweight/obesity risk and nutrition transition. This may be explained by the cultural aspects of food consumption and that families of Balkan origin tend to consume more pastry than local families. As previous studies show that it is always more difficult for immigrants to follow health promotion activities than the local population.[32]

Secondly, another demotivating factor is that creating a balance between weight loss program and the family routines, since devoting time to activities of health promotion and physical activity appear to difficult for adults having obesity.[33] On the other hand, pressure by spouses on women to maintain accustomed family eating order might be another reason for loss of motivation. The positive effects of family solidarity and partner support during obesity treatment have also shown to be effective in a previous study.[34]

Finally our multivariate analyses results revealed that one of the main determinants of adherence to a weight-loss regime is the attitude toward obesity. In several studies, conceptually based on Theory of Planned Behavior.[35] on weight loss attempt, showed that attitude towards obesity affects weight loss intention which favors to our study results.[36-39]

Our study has limitations: 1) we did not set a weight-loss a specific target for women at the beginning of the intervention, as it had been done in some other intervention studies.[40] 2) the short duration of this intervention might have been masked its long-term residual effects, and further monitoring of the volunteer women will be required. 3) the fact that no standard method was followed regarding the distribution of women to women's leadership groups could lead to bias. However, if the distribution had been random, the possibility that some women would fall

into groups of leading women with whom they had previous social problems might have led to a greater bias. 4) the other intervention item that was intended to be used at the beginnig of this study, along with physical activity, was balanced diet. For this purpose, diet lists were distributed to all women, in addition to nutrition training provided to the leading women by a dietitian, but no significant feedback was received from the peer leaders regarding the nutritional status of the women in their groups. This made it impossible for us to generate sufficient data on the nutritional aspect of the weight loss intervention program. 5) and finally, the fact that the spouses of the women were not included in the intervention could have been a factor that decreased the success of the intervention since nutritional behavior itself is a commune and cultural behavior that all members of the family usually perform.

CONCLUSION

To reach passive and less voluntary groups in communities, community-based obesity interventions are much more promising than facility-based interventions.

In this intervention study, which aimed to have overweight and women having obesity to lose weight with a peer support at the primary care level. The participants lost a significant amount of weight, however more weight loss was achieved in the first three months of the intervention rather than the second 3 months and the women were not able to sustain the mentioned weight loss in the second three months. Although it is much more difficult to maintain, along with the use of appropriate technology we suggest a very new leading women intervention approach for rural, community-based obesity interventions. Further studies are needed to reveal the factors that play a role in maintaining weight loss in primary care obesity interventions.

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