Effectiveness of a Peer Support Intervention Program on Obesity Control Among Women in a Rural Area of Turkey

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Research

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Abstract

Background

Obesity in women is one of the leading public health problems globally. Peer support interventions have been effective in many areas of health promotion, and they have also been successful in obesity prevention and treatment.

Methods

This is a quasi-experimental obesity peer-led intervention study called the Leading Woman Model. At baseline, the obesity prevalence was found to be 60.5% among women aged 18–64 (n = 655) living in a rural district of Turkey. Of the participants (n = 137), 86.9% completed the 3rd month and 78.1% the 6th month of the intervention. Leading women (n = 11) were recruited from the community to supervise and monitor their own target groups of women during the intervention, which included supervised balanced nutrition and regular physical activity.

Results

The mean age of the target intervention group was 42.8 ± 12.2. Significant improvements were observed in the body weight of the participating in the 3rd (-1.15 ± 2.51 kg) and 6th month (-1.13 ± 4.15 kg) of the intervention ($p < 0.05$). Of the women, 10.9% lost at least 5% of their weight by the 3rd month and 13.1% by the 6th month of intervention, and 8.4% and 11.2% of the women achieved a better BMI category in the 3rd and 6th month of intervention, respectively.

Conclusion

Community-based obesity interventions are challenging but much more promising than those based at a facility. We suggest the Leading Women Model for community-based obesity interventions in women.

Background

Obesity is the second most common cause of preventable deaths globally after smoking (1). In all of the World Health Organization regions, women are more likely to be obese than men (2). The overweight and obesity prevalence in Turkey was reported to be 22.3% and 33.1%, respectively, in a 2018 national obesity study report (1).

Lifelong multidisciplinary treatment, including behavioral therapy, is required for the successful treatment of obesity (3). Behavioral change therapy cannot be successful unless adequate social support is provided by relatives and close friends/peers. Peer support has increasingly been used throughout the world as a health promotion strategy to lead people to address their health and social problems (4–6). Community based, peer-assisted obesity interventions are scarcer in the literature compared with peer-

supported interventions that have been carried out in a clinical context (7,8). The main difference between community-based and hospital-based trials is the target population's accessibility to health services.

Our aim was to develop a new peer-based obesity intervention model that could be integrated into routine primary care services. We set out a semi-structured model that aimed to help women lose weight with the help of their peers and services readily provided by all primary health-care organizations in our country. Therefore, the purpose of this research was to reduce the Body Mass Index (BMI), fat ratio, and fat amount of the targeted women through the support of their peers (leading women) by regulating nutrition and improving physical activity in a rural community.

Methods

Study design

This quasi-experimental field intervention study was conducted in a rural district of Manisa province in Turkey. The peer-led training intervention model used in this study was named the Leading Woman Model.

The study consisted of two main stages: population weight screening and field intervention. To start with, all women living in the district aged 18–64 (n = 655) underwent weight and height measurement. Of them, 396 women were found to be overweight or obese and subject to intervention. Forty women were excluded from the study due to medical conditions, and 219 women did not join the intervention program after being informed that it would include nutrition and exercise requirements. Eventually, 137 women were accepted for participation in the intervention program, which is the second stage of the study. The flow diagram of the study stages is presented in Figure 1.

Subjects

The women were either national or international migrants, with the majority being Slavic Muslims known as Pomaks. Two distinct participant groups were identified:

Leading Women: Leading women (n = 11) were chosen to act as trustworthy mentors and guides for the women. They were recruited from the community based on the discussions of a panel of community health professionals including staff at a family health center and local pharmacists.

Target women: Overweight and obese women with a BMI range of 25.00 to 39.99 (n = 126) were the targets of the intervention. They were all willing to participate in the peer intervention program in the district.

Assigning the target group to the leading women

Each of the 11 leading women were asked to select the women with whom they had social contact, and preferably those who lived on neighboring streets or roads, to enable good communication and easy access. The range of the number of women assigned to a leading woman was 5 to 17.

Intervention infrastructure

Of the 137 women who agreed to participate in the intervention, 86.9% (n = 119) completed the first 3 months of the intervention and 78.1% (n = 107) completed its 6-month target.

The intervention infrastructure was divided into three main items.

1. Anthropometric and biometric device preparation

Each leading woman was given electronic scales sensitive to 100 grams to measure the weight of the women in her group. A stadiometer already present at the family health center was used to measure their height. Body analyses of the women, such as for 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 all participants during the intervention period.

2.*Questionnaire battery*

This battery consisted of the women's demographic, anthropometric, and biometric characteristics and their medical conditions, exercise status, and self-assessment of compliance with the nutrition program. The battery also included three supplementary scales, namely the International Physical Activity Questionnaire (IPAQ), to assess the women's physical activity; Attitudes Towards Obese People (ATOP), to measure their attitudes towards obesity; and the Hospital Anxiety and Depression Scale (HADS), to evaluate the depressive mood of the women. IPAQ classified respondents into three activity subcategories (high, moderate, and low) (9). ATOP scores were treated as a continuous variable in the analysis: the higher the score, the better the attitude towards obese people (10). HADS scores were recoded as dichotomous variables with a cut-off value of 7.0 (11). The HADS and IPAQ forms were filled in at baseline and at the 3rd and 6th month of intervention. ATOP was only tested at baseline.

3. Leading Woman Training

The leading women were initially given a 3-day training courses on obesity, nutrition, and physical activity and exercise. The courses were conducted by a community health dietitian and exercise experts working at Celal Bayar University.

Intervention procedure

The intervention lasted a total of 6 months (Figure 1). The inclusion criteria were having a BMI range of 25.00–39.99 kg/sqm and volunteering for the intervention. The exclusion criteria were pregnancy, breastfeeding, physical or intellectual disability (including cancer, post-myocardial infarct, multiple sclerosis, and chronic neurologic diseases), morbid obesity (BMİ ≥40.00 kg/sqm), and unexplained tachycardia.

Baseline height measurement, waist and hip circumference measurements, and bioelectrical impedance analysis were done for each woman. The forms were distributed to the target women and leading women following the baseline measurements. Each woman was given a standard diet list and asked to report her nutrition practices daily through the forms.

The three main tasks of the leading women were: 1) individual and group interviews (at least once a month) with the women under their guidance, 2) organizing regular neighborhood exercise sessions, and 3) keeping records.

At the 3rd month of intervention, we measured the waist and hip circumference and weight of the target women and applied the IPAQ and HADS depression subscales. The intervention ended at the 6th month of the intervention period.

Outcomes of the intervention

The outcomes of the intervention were classified into two groups:

1. Weight and mean weight differences

1. Mean body weight difference (baseline–3rd month–6th month of the intervention)
2. 5% weight loss (baseline–6th month of the intervention)
3. BMI category reduction: from overweight/obese to BMI <25 or from obese to BMI = 25.00–29.99 (baseline–6th month of the intervention)

2. Mean difference in biometric indices (baseline–6th month of the intervention)

1. Body fat mass (trunk plus extremities)
2. Body fat ratio (trunk plus extremities)
3. Trunk fat mass
4. Trunk fat ratio

5. Body muscle mass (trunk plus extremities)

The independent variables of this study were sociodemographic variables; physical activity (by metabolic equivalent of task (MET) score), attitude to obesity, and depressive mood; and health and body image perception, family history of obesity, previous weight loss attempts, previous physical activity practices, fertility history, and having any chronic illness.

Statistical analysis

Paired t-test and Wilcoxon test were conducted for comparisons of dependent groups; Student's t test, Mann–Whitney U test, Kruskal–Wallis, Chi-square, and Fisher's exact test were used for comparisons of independent groups, where appropriate. Cochrane's Q analysis was employed for repeated measures of dichotomous variables. The analyses were performed by SPSS 23.0 statistical package and type 1 error was accepted as 0.05.

Ethical issues and funding

Written informed consent was obtained from the target women in this intervention. This study was approved by the Manisa Celal Bayar University Faculty of Medicine Clinical Research Ethics Committee, dated 21.06.2017, issue no 25160. It was granted by the Manisa Celal Bayar University Research Projects Coordination Office through Project Grant Number 2018-013.

Results

The mean age of the intervention group (n = 126) was 42.8 ± 12.2. The sociodemographic characteristics of the target intervention group are shown in Table 1. Of the women, 72.2% perceived themselves to be overweight/obese and 81.7% were not satisfied or hesitant about their body weight before the intervention. About half of the women had attempted to lose weight at least once previously.

Baseline data revealed that the prevalence of overweight plus obesity (BMI ≥25.00) was 68.9% (n = 637), including 43 morbid obese (BMI >40.00). IPAQ results showed that 4.8%, 45.2%, and 50.0% women reported high, moderate, and low physical activity scores, respectively, prior to the intervention. The mean ATOP scale score was 58.55 ± 16.4, and the HADS assessment indicated a 31.7% prevalence of depressive mood.

The median age of the leading women was 44.0 (min 29.0, max 62.0); 50.0% of this group were primary, 33.3% secondary, and 16.7% high-school graduates.

Significant improvements were observed in weight and waist circumference of the women at the 3rd and 6th month of the intervention. The mean weight loss was 1.15 ± 2.51 kg, and waist circumference decrease was 0.96 ± 2.53 cm at the 3rd month of the intervention ($p < 0.05$). At the 6th month of the

intervention, the mean weight loss was 1.13 ± 4.15 kg and waist circumference decrease was 1.30 ± 2.53 cm. Of the women, 10.9% lost at least 5% of their weight at the 3rd month and 13.1% did so at the 6th month of the intervention, and 8.4% and 11.2% moved to a better BMI category at the 3rd and 6th month of the intervention, respectively (Table 2). The mean body muscle mass increase was 0.08 ± 4.51 ($p = 0.021$), and the mean body fat mass decrease was 1.73 ± 4.02 ($p < 0.001$; Table 2).

The physical activity level of the women, in terms of MET score, was significantly increased, from 867.2 ± 798.5 to 1445.4 ± 1444.6, in the first period (baseline–3rd month; $p < 0.001$), but it did not change in the second period (3rd–6th month) of the intervention ($p > 0.05$). The rate of depressive mood was 37.4% at baseline, 18.7% at the 3rd month, and 15.9% at the 6th month of intervention ($p < 0.001$).

The second part of the results presents the causality between anthropometric changes and the independent variables.

Average weight loss between baseline and the 3rd month of intervention was only sensitive to working status, health insurance coverage, residency/migration status, and spouse's education. The remaining independent variables were not sensitive to weight loss in the first 3 months of the intervention (Table 3).

Table 4 presents the independent variables that would explain the effect of the intervention on weight loss of at least 5% and BMI category reduction at the 3rd month of the intervention.

The percentage of women who lost at least 5% weight was higher among secondary school graduates than primary school graduates. There was no significant relationship between weight loss of 5% and BMI category reduction and other independent variables (Table 4).

A statistically significant dose–response relationship was found for BMI category reduction and ATOP score ($p = 0.049$). On the other hand, stratified analysis of ATOP showed that significant weight loss was observed among those women who had a positive attitude towards obesity ($p = 0.002$).

Physical activity in terms of MET score and ATOP were not found to have a significant relationship with weight loss (any weight loss, at least 5% weight loss, or BMI category reduction).

Discussion

The overall overweight and obesity prevalence was 68.9% in the community, which is quite high and consistent with the country data (12,13).

Peer interventions have frequently been used internationally to promote health and healthy lifestyle behaviors (5,6), including well-balanced nutrition and physical activity (7,8). Almost all community-based obesity interventions in Turkey have implemented behavioral education, diet, and exercise programs with professional support (14–16). This study has two distinctive features, namely the intervention is both peer-based and community-based.

Mean weight loss during the course of our intervention was 1.13 ± 4.15 kg. However, it was found to be 2.8 kg in an obesity intervention conducted in an urban primary care area in Turkey (16), 2.1 kg in a health promotion club in Japan (17), and 6.4 lbs among college students in the United States (19), which were all somewhat higher than our figure.

If we assume that sensible weight loss is weight loss of ≥5% body weight and/or BMI category reduction, then only about one in 10 women showed considerable weight loss at the end of the 3rd month of the intervention. In national and global obesity intervention studies, the rate of individuals who lost at least 5% body weight varied between 20% and 30.3% (16,19,20). Our weight loss figures are lower than the previous studies, which were mostly conducted in urban populations. The higher weight loss figures in these studies compared to ours may be attributed to either the higher level of education of the urban women or their greater willingness to be involved in the interventions. In our study, overweight/obese women were invited to participate in the intervention rather than them coming deliberately to the primary health-care center. The majority of the published field obesity interventions were institution-based. In these interventions, an overweight/obese person would deliberately go to a clinic to lose weight, while in community-based interventions, a person might not initially be willing to participate. Therefore, the observed success of the intervention—although not as good as an institution-based intervention—is more realistic, and the results can be more generalizable.

The percentage of women whose BMI category reduced in the first 3 months of the intervention was 8.4%, and it was 11.2% throughout the intervention. BMI category reduction ranged between 20.0% and 27.9% in some other interventions (16,21), and these were clearly higher than ours. 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 rural districts (22).

The improvements of the anthropometric measurements in the first three months of the intervention were significantly better than those of the second intervention period (3rd–6th month). The intervention started in the summer months, when people were more physically active with, e.g., vineyard farming activities, and lasted until the end of fall, which is the region's wet season . As a matter of fact, at the end of the 3rd month of the intervention, the mean MET scores of the women were significantly higher than the baseline MET scores, but they fell below the baseline value at the 6th month of the intervention. Therefore the decrease in weight loss in the second period of the intervention might be associated with slowing of physical activity during the same period.

The predictors of weight loss in this study were higher education of women, having universal health insurance, being native (not migrated from Bulgaria), being unemployed, and married with a low-educated husband. It was demonstrated in several obesity interventions that higher educated people would benefit from community-based health promotion programs more than others (23,24). Unemployed women whose husbands had a low education level may have benefited more from the intervention because they were much more overweight at baseline. 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 Bulgarian origin tend to consume more pastry than native families. Some literature evidence has shown that it is always more difficult for migrants to follow health promotion activities than the native population (25). Our intervention program was carried out in a rural district, and cultural issues are very important among rural and migrant populations. Gender norms and expectations that are very important in these populations may also restrict the opportunity to exercise (26).

One of the main determinants of adherence to a weight-loss regime is lack of acceptance of obesity as a health problem. A second negative demotivating factor might be finding a balance between professional/house work, and family routines, since devoting time to health and physical activity appears difficult for adults with obesity (27). Pressure by husbands on women to maintain the family's food regime may be another reason for loss of motivation. Indeed, we did not detect any significant weight loss in husbands during the intervention. The positive effects of family solidarity and partner support during obesity treatment have also been reported in several previous studies (28).

Finally, we found that a positive attitude to obese people helps weight reduction. In his review, Gordon Cochrane (29) claimed that self-efficacy correlates positively with success in all realms of personal endeavor, including weight loss.

There were some limitations for this study. We may assume that the means of identification of each leading women and selecting the target women under their supervision might be an important reason for the low rate of participation. The selection of leading women was based solely on the subjective assessment of primary health-care professionals, and no objective criteria were used. Therefore, it is questionable whether the leading women were eligible leaders or not.

Another limitation of our study is that we did not set a weight-loss goal for women at the beginning of the intervention, as had been done in some other intervention studies (30). Also, the very short duration of this intervention may mask its long-term residual effects, and further monitoring of the target women may be required.

Conclusion

Community-based obesity interventions are much more promising than institution-based ones, because they gives us the opportunity to reach passive, non-volunteer groups in communities. We suggest a very new leading women intervention approach for rural, community-based obesity interventions.

Abbreviations

BMI: Body Mass Index

IPAQ: International Physical Activity Questionnaire

ATOP: Attitudes Towards Obese People

HADS: Hospital Anxiety and Depression Scale

MET: Metabolic Equivalent of Task

Declarations

Ethics approval and consent to participate

Written informed consent was obtained from the target women in this intervention. This study was approved by the Manisa Celal Bayar University Faculty of Medicine Clinical Research Ethics Committee, dated 21.06.2017, issue no 25160.

Consent for publication

This manuscript does not contain any individual personal data in any form. Patient informed consents (forms) were taken from each of the participants.

Availability of data and materials

We can prepare the English verson of the study SPSS data and send to the journal in case of any need.

Competing interests

The authors declare no conflicts of interest.

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Authors' contributions

Berna Bilgin Sahin.: Literature scanning, planning the research, conducting research, analysis, writing the article, evaluation of the article, interpretation of the article.

Erhan Eser: Literature scanning, planning the research, conducting research, analysis, writing the article, evaluation of the article, interpretation of the article.

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Tables

Table 1

Sociodemographic characteristics of the target women (n = 126)

Variables		Number	Percent (%)
Age (years, mean ± sd)		42.79 ± 12.20	
Marital status	Married	115	91.3
	Single	4	3.2
	Widowed	7	5.5
Educational status	Illiterate	3	2.4
	Primary school	51	40.5
	Secondary school	40	31.7
	High school and further	32	25.4
Work status	Housewife	75	59.5
	Working	43	34.2
	Retired	8	6.3
Family type	Nuclear family	97	77.0
	Immediate family	29	23.0
Health insurance coverage	Yes	111	88.1
	No	15	11.9
Migration status	Immigrant	43	34.1
	Native	83	65.9
Total		126	100.0

Table 2

Improvements in weight loss and biometric outcomes 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)
Anthropometric outcomes		
Any weight loss	71.0%	58.9%
Mean weight loss (kg)	-1.15 ± 2.51	-1.13 ± 4.15
Median (min/max) weight loss (kg)	-1.00 (-13.0/+5.1)	-0.5 (-21.8/+6.7)
Weight loss of at least 5%	10.9%	13.1%
BMI category improvement	8.4%	11.2%
Mean waist circumference decrease (cm)	-0.96 ± 2.53	-1.30 ± 3.85
Biometric outcomes (mean differences)		
Body muscle mass (kg)	-	25.7 ± 3.2–26.1 ± 3.4[1] *
Body fat mass (kg)	-	32.4 ± 8.5–30.6 ± 8.4[1] **
Body fat ratio (%)	-	40.5 ± 5.9–38.8 ± 6.6[1] **
Trunk fat mass (kg)	-	16.7 ± 3.9–16.0 ± 4.1[1] *
Trunk fat = ratio (%)	-	41.3 ± 4.9–39.8 ± 5.7[2] **

*[1] Wilcoxon signed rank test; [2] Paired t test; * <0.05; ** <0.001*

Table 3

Relationship of weight difference with sociodemographic and other variables

Variables		Median weight difference (0–3 month) (min, max)	p-value
Age	18–34	-0.70 (-5.70, 3.20)	0.987**
	35–49	-0.90 (-13.00, 5.10)	
	50–64	-1.20 (-5.60, 1.70)	
Educational status	Primary school and below	-8.85 (-13.00, 3.20)	0.871*
	Secondary school and above	-1.20 (-7.90, 5.10)	
Work status	Employed	-0.40 (-13.00, 5.10)	**0.041***
	Unemployed	-1.20 (-7.90, 2.60)	
Health insurance coverage	Yes	-1.20 (-13.00, 5.10)	**0.012***
	No	0.60 (-4.00, 2.70)	
Migration status	Native	-1.30 (-13.00, 5.10)	**0.019***
	Bulgarian migrant	-0.40 (-5.30, 3.20)	
Spouse's education	Primary school and below	-1.40 (-5.60, 5.10)	**0.048***
	Secondary school and above	-0.40 (-13.00, 3.20)	
Baseline BMI	Obese	-1.20 (-13.00, 3.20)	0.317*
	Overweight	-0.75 (-5.60, 5.10)	
Presence of another overweight person in the household	Yes	-1.20 (-7.90, 5.10)	0.757*
	No	-0.85 (-13.00, 2.40)	
Weight satisfaction	Not satisfied / undecided	-1.00 (-13.00, 5.10)	0.817*
	Satisfied	-1.00 (-5.10, 2.60)	
Weight loss attempt before intervention	Yes	-0.85 (-13.00, 5.10)	0.715*
	No	-1.20 (-7.90, 2.60)	
Daily TV watching habit	Yes	-1.20 (-13.00, 5.10)	0.383*
	No	-0.40 (-6.50, 3.20)	
Risk of depression before intervention	Yes	-1.30 (-7.90, 2.60)	0.427*

	No	-0.70 (-13.00, 5.10)
**Mann Whitney-U; **Kruskal Wallis Anova*		

Table 4

The relationship between BMI category reduction and body weight loss of at least 5%

Variables		BMI category change (baseline–3rd month)		Body weight loss of at least 5%	
		BMI category reduction n (%)	p-value	Weight loss at least 5% n (%)	p-value
Age	18–34	4 (10.8)	0.595*	4 (10.8)	0.209*
	35–49	4 (9.8)		7 (17.1)	
	50–64	2 (4.9)		2 (4.9)	
Educational status	Primary school and below	3 (6.1)	0.522**	2 (4.1)	**0.045***
	Secondary school and above	7 (10.0)		11 (15.7)	
Work status	Employed	2 (5.1)	0.495**	6 (15.4)	0.349**
	Unemployed	8 (10.0)		7 (8.8)	
Health insurance coverage	Yes	10 (9.6)	0.358**	12 (11.5)	1.000**
	No	0 (0.0)		1 (6.7)	
Migration status	Native	9 (10.3)	0.285**	11 (12.6)	0.510**
	Bulgarian migrant	1 (3.1)		2 (6.3)	
Spouse's education	Primary school and below	4 (8.5)	1.000**	3 (6.4)	0.354**
	Secondary school and above	6 (9.1)		9 (13.6)	
Baseline BMI	Obese	6 (10.5)	0.517**	6 (10.5)	0.894*
	Overweight	4 (6.5)		7 (11.3)	
Presence of another overweight person in the household	Yes	4 (7.3)	0.751**	5 (9.1)	0.552*
	No	6 (9.4)		8 (12.5)	
Weight satisfaction	Not satisfied / undecided	7 (7.4)	0.420**	13 (13.7)	0.068**
	Satisfied	3 (12.5)		0 (0.0)	
Weight loss attempt before intervention	Yes	6 (9.7)		6 (9.7)	

	No	4 (7.0)	0.745**	7 (12.3)	0.649*
Daily TV watching habit	Yes	10 (11.4)		9 (10.2)	
	No	0 (0.0)	0.062**	4 (12.9)	0.740**
Risk of depression before intervention	Yes	2 (4.9)		3 (7.3)	
	No	8 (10.3)	0.491**	10 (12.8)	0.539**
**Chi Square; **Fisher's exact test*					

Figures

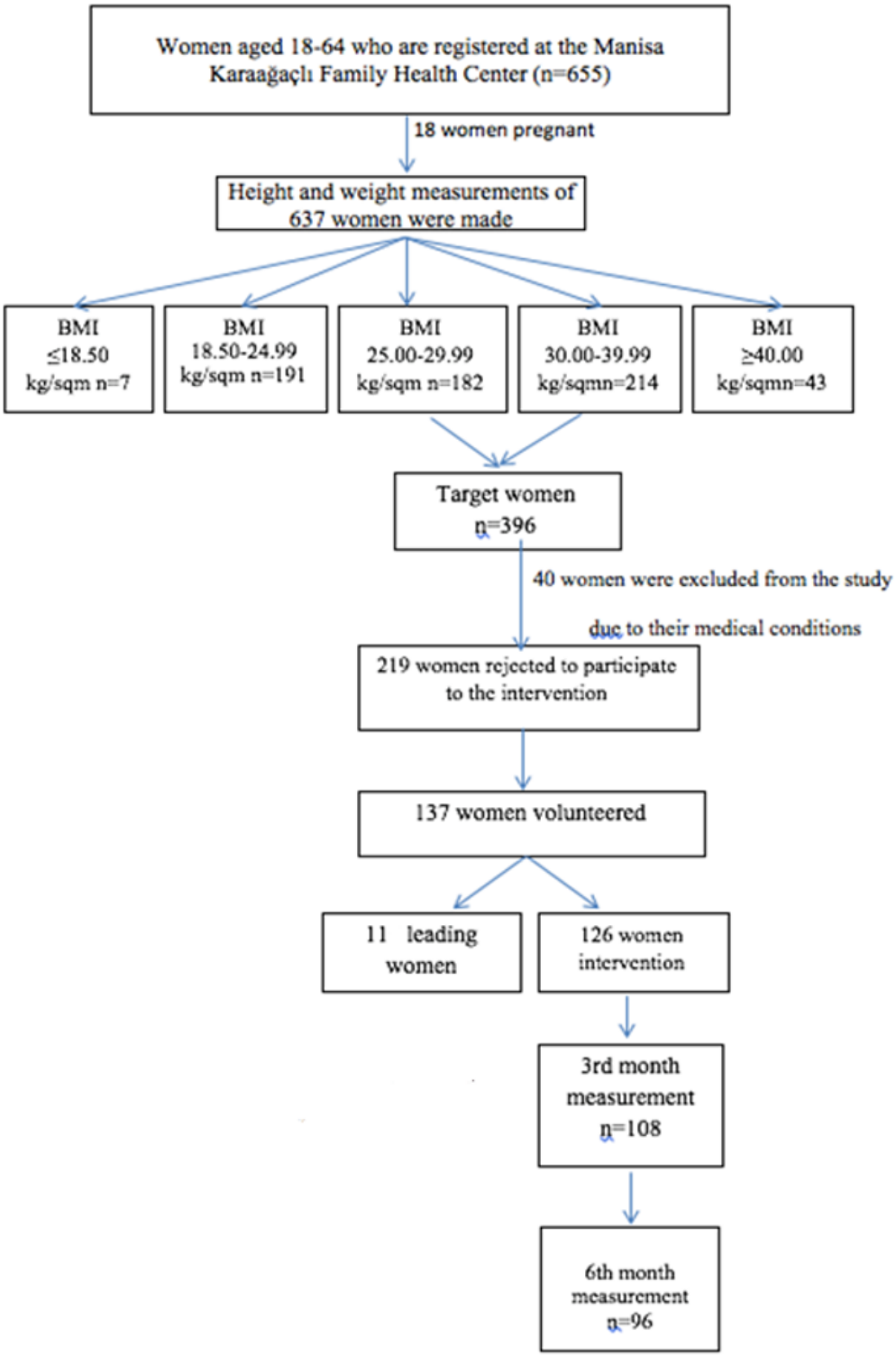

Figure 1

Research design and sampling