



## Research Paper

# The Effect of Internet-Based Intervention on Lifestyle and Healthy Nutrition Habits of Women in North of Iran: A Field-Based Trial Study



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## ABSTRACT

**Background:** A healthy lifestyle based on healthy eating habits and appropriate physical activity during different periods of life, bring healthy old age to women through preventing overweight or maintaining a healthy weight

**Objectives:** This study was aimed to determine the effect of Internet-based intervention on the lifestyle and healthy eating habits of women in northern Iran.

**Materials & Methods:** The present field-trial study was conducted on 268 women who were members of Population of Mental Health Assistants from November 2014 to May 2015. The educational intervention was carried out through a website containing information on healthy lifestyle, nutrition, and cooking methods of various healthy foods. The participants of the intervention group were also received their special diet. All participants were evaluated after 3 and 6 months in terms of changes in weight, BMI, systolic and diastolic blood pressure, and nutritional habits. Their lifestyle were measured using the standard questionnaire of Health-Promoting Lifestyle Profile-II (HPLP-II). Data was analyzed using repeated measure analysis of variance.

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**Results:** The average age (Standard Deviation (SD)) of the intervention and comparison group was 38.7 (10.8) and 36.9 (10.8) years, respectively. After six months, the average BMI of the intervention group decreased from 27.4 (SD=5.3) to 26.3 (SD=5.7) kg/m<sup>2</sup> (P<0.001). Systolic and diastolic blood pressure of both groups showed a significant decrease (P<0.001). Nutrition ( $F_{1,266}=62.09$ , P=0.001,  $\eta^2=0.19$ ) followed by health responsibility ( $F_{1,255}=30.4$ , P=0.001,  $\eta^2=0.11$ ) were the most important dimensions of HPLP-II affected by intervention.

**Conclusion:** The Internet-based educational intervention program, using a bottom-up approach, has a favorable effect on the improvement of the lifestyle and weight loss of the participants. The findings of the present study showed the possibility of using the new e-health technology in order to promote healthy lifestyle and eating habits in women.

**Keywords:** Lifestyle, Internet, Empowerment, BMI, Nutritional status

## 1. Introduction

According to the definition of the World Health Organization, lifestyle is a combination of behavioral patterns and individual habits throughout life, which have been created as a result of socialization [1]. Lifestyle habits inevitably influence on individuals' health [2]. Due to the well-known connection between lifestyle and the high costs of lifestyle-related diseases, emphasizing the principles of prevention, improvement and promotion of preventive and health behaviors is an important priority in public health. By using strategies to promote health and prevent diseases, the occurrence of many health complications related to lifestyle can be prevented or delayed [3]. Therefore, on this basis, knowing these behaviors and acting on them is of particular importance. Its significance increases in the case of women because of well-known relationship between lifestyle and many common problems and diseases related to sex, such as breast and uterine cancers, obesity, mental problems and depression, stress and menopause. Therefore, it is often strongly recommended that women engage in healthy behaviors such as healthy eating, regular exercise, proper stress management, and regular health monitoring at every stage throughout their lives [4].

Abdominal fat tissue in middle-aged women and the years leading to menopause increases by approximately 3.8 to 4.4% annually, and this leads to an increase in the risk of heart and metabolic diseases, partly due to an increase in Body Mass Index (BMI). Therefore, lifestyle behavioral interventions based on weight loss in middle-aged women have been successful, and changes in lifestyle patterns including more mobility, healthy eating habits, and management of psychological issues such as depression symptoms can play a major role in reducing women's BMI and improving their health [5]. Health promotion is considered as the main solution to reduce disability and early mortality and includes individual and group ability to actively participate in the process of cre-

ating health, which requires the involvement of all sectors of society. Here, empowerment is considered as the core of health promotion [6, 7]. Therefore, the traditional view of community members as passive participants in health care services should be changed to a newer perspective in which people are seen as active and capable partners [8]. In order to implement community empowerment programs using a top-down approach, where there are usually predetermined goals, health promoters face challenges that force them to adopt a bottom-up approach [9]. Since 1986, in the Ottawa Charter, by recognizing the science of health promotion as the science and art of helping people to be able to have a healthy lifestyle and its role in having a healthy lifestyle, researchers have expanded the scope of health promotion to support environmental changes and social reduction of health inequality in the society. In this charter, the meaning of health promotion, empowerment and capacity building through a bottom-up approach to identify society's problems and find solutions for the development of environmental and social factors is stated [10].

Studies show that educational programs play an important role in empowering people by providing the necessary knowledge and awareness to perform tasks and also by increasing the support of peers. The available evidences in most of the developed countries indicate that educational activities of social development and empowerment strategy both in the individual and social dimensions have not only prevented the occurrence of infectious and non-infectious diseases, but can lead to a reduction of inequality and the expansion of social justice in developing countries [11]. Many methods have been described for adult education, but Internet-based educational interventions, compared to other face-to-face interventions, make it easy to reach a large number of audiences and facilitate the possibility of reading and using information based on the audience's choice with the advantage that the audience decides when to access the information and read them based on their needs. This type of flexibility in accessing information eliminates the barriers caused by time, place or facilities that are

given in most studies, and theory-based interventions through the global network of computers will increase the level of general health [12]. Another positive aspect of Internet-based intervention is related to its privacy and confidentiality for people, because they can use it at home and whenever they want. Also, the use of this type of intervention provides immediate feedback from people. There is now growing evidence of the high success of Internet-based interventions [13]. In the future, health care customers will benefit greatly from social networks, even for individual health plans, especially in the field of drug treatment and preventive care; Therefore, the use of technologies such as electronic health can potentially reduce health injustices in urban areas by increasing the quality of care [14]. Therefore, considering the importance of explaining a healthy lifestyle in women and considering the importance of personal and social empowerment of women who are members of popular volunteer groups, this study aims to determine the effect of internet-based intervention on the lifestyle and healthy eating habits of women in northern Iran as a field-based trial study.

## 2. Materials and Methods

### Study type and study population

The present study is a field-trial that was conducted on the Population of Mental Health Assistants (PMHA) from November 2014 to May 2015 in 12 NGO centers of health assistants in two cities of Guilan province in the north of Iran. PMHA is a non-governmental organization and operates under the supervision of the Welfare Organization. The population of PMHA is mainly made up of volunteer women who collaborate to improve the public health of the society. Inclusion criteria include being at least 30 years old, BMI above 25 kg/m<sup>2</sup>, ability to work with computer, and permanent living in Guilan province. People with chronic diseases or unwillingness to attend the meetings were excluded from the study. After coordinating with the welfare organization of Guilan province and, a list of the offices of the PMHA in the province was prepared. After coordination with the offices of PMHA in Guilan province, according to the required sample size and the number of active members in different cities of the province, the two cities of Rasht and Fuman were selected from the list of all cities of Guilan province. Since PMHA centers were located at different neighborhoods and were not geographically close to each other, randomization was performed at the level of PMHA to reduce contamination bias. A total of 12 centers were randomly allocated to the intervention

(6 center) and comparison (6 centers) groups using cluster random sampling method.

Sample size was calculated based on the results by Tate et al. [15]. A total of 268 subjects were calculated according to the standard deviation of mean difference in BMI as 5.7, and considering 2% precision with a two-sided 5% significance level, 80% power, and 10% attrition rate. Participants were selected using simple random sampling method on the membership number at each center. The selected participants were invited by phone and the first introduction meeting was held. This meeting was conducted for both the intervention and comparison groups and included the description of the plan and completing the pre-test questionnaires; Clarification was made for the intervention group about the implementation process of the program and the holding of working groups was also coordinated. Obviously, there was no intervention for the comparison group. At the end of the program, three and six months later, both groups completed the post-test questionnaires.

### Intervention protocol

At first, both groups completed the study questionnaires in the pre-test phase. In the next step, based on the bottom-up approach of empowering people according to Ottawa Charter the participants were asked to identify the most important problems and issues related to their lifestyle. The participants were divided into groups of 20 to 25 people and five 2-hours discussion sessions as follows were held for subgroups, separately. First session, the participants were asked to state the main and key health issues and problems (all the stated issues were written by one person). Second session, to avoid overlapping issues or repeating a problem, they were asked to clearly explain the problem they stated. Third session, with the help of the program manager, the issues and problems were categorized and placed in the format of the dimensions of the health-promoting lifestyle profile-II questionnaire. Fourth session, they were asked to prioritize their problems. Fifth session, they were asked to express their opinion about each of the problems and 5 health priorities were chosen by consensus. The working method was such that after conducting the initial talks and examining the concepts related to the program and ensuring the creation of common concepts between the presenter and the participants of the program, the current state of general health of the target community was investigated. The examination of the existing health situation was not completed in one meeting due to the long discussions and the need for a final summary, and this was done in two meetings. In these two sessions, all

participants actively answered the researcher's question, "Which problem in your health field needs more attention and education?" A list of participants' answers was prepared. Similar or close responses were grouped. The most important health problems according to the participants were: improper nutrition; excessive consumption of fast food in society; Obesity and high body mass index, especially in women of the province, and insufficient mobility of adults in the community. At this stage, the health expert guided the discussions and helped the participants in choosing the health priority for the intervention by providing the necessary statistics and information about the existing conditions of the society. At the end of these meetings, due to the similarity of the first three health problems, it was decided with the agreement of the group that the lifestyle intervention program is based on healthy nutrition and sufficient movement for fitness and health. After voting, the problem of obesity and improper nutrition was chosen as a major health problem that requires the educational intervention of a health expert. In the last session of this phase, the level of knowledge, awareness and skills of the participants was evaluated. This was done by asking questions about the types of skills that might be needed during the program or basic questions about the level of health literacy of the participants in the form of directed discussions and managed by the program expert.

### Internet-based educational intervention

To provide internet-based education for the intervention groups, a website was created at [www.healthhamyaran.com](http://www.healthhamyaran.com). In this website was an educational basis where information related to the health promotion of volunteers according to the objectives of the study was placed. In order to make it easier for users to access this website, its direct link was placed under the title of PMHA's Health Promotion Program on the main page of the exclusive site of PMHA of Guilan province at the address (<http://www.hamyarangilan.blogfa.com>). Educational topics related to healthy nutrition and appropriate physical activity were determined based on the results obtained from group consensus interviews and the bottom-up approach derived from Laverack's parallel track model [9]. Then the protocol and educational topics related to the topics and titles determined in the first stage were prepared in consultation with the experts of the research team. All participants of the intervention group were provided with a unique username and password so that they could enter their personal page. A briefing session was held for the intervention group regarding the site and how to enter and its different sections. It was possible to access the website contents only through the unique username and

password of each user, who were exclusively women assistants of the intervention group. There were three sections on this website: nutritional information, physical activity information, and healthy weight information. In the healthy weight section for each user, based on their initial calculated BMI, a sample diet was placed that was explained by the nutritionist of the plan. This diet was changed according to the new BMI after each time the participants' weight was calculated (at the end of the third and sixth months of the intervention). At the end of the analysis of the results of the first post-test and the overall assessment of the intervention group, appropriate changes were applied to each participant's page.

The posted content, which was updated every two weeks during the intervention period on the website, consisted of four general packages: "Facts about a healthy lifestyle"; "Healthy diet"; "physical activity" and "healthy weight".

For re-measurements, each participant was contacted by phone to coordinate the appointment time. At the end of the third month after the intervention, the weight and BMI change chart of the intervention group was prepared and the new diet was uploaded on the site with the corresponding code for each person. Informing about the new uploaded cases and any activity related to the intervention was carried out through the board of the PMHA offices, sending SMS to the people of the intervention group and posting the news on the PMHA website. To complete the questionnaire at the end of the third and sixth month after the intervention, the colleagues of the research team, after coordinating with the heads of the offices, attended the monthly meeting of the volunteers and provided the questionnaires to the participants in the study. In this meeting, possible questions of the participants were also answered.

### Study instrument

A questionnaire including two sections was used to collect information. The first part included personal characteristics and clinical measurements of people: age, duration of membership in PMHA, marital status, number of children, education, occupation, height, weight and blood pressure. Blood pressure was measured using a mercury sphygmomanometer (model Alpk2) in a standard situation. Sergio scale (model SWB-10) was used to measure weight of the participants. The same tape measure was used to measure height. Body Mass Index (BMI) was calculated as weight in kilogram divided by height in square of meter.

The second part of the standard questionnaire was Health-promoting lifestyle profile II (HPLP II). The HPLP II questionnaire has already been translated into Persian by translators and used in many studies. The validity and reliability of the Persian version of this questionnaire has been approved in Iran. Cronbach's alpha coefficient was reported to be about 0.82 in the study by Mohammadi Zaidi et al. (2013) and about 0.78 in the study by Tanjani et al. [16, 17]. The six dimensions of healthy lifestyle that are evaluated in this questionnaire, including nutrition, responsibility for health, interpersonal relationships, spiritual and spiritual growth, physical activity and stress management, is measured using 52 questions in a four-point Likert scale; "never" (1), "Sometimes (2), often (3) and always (4)". Four dimensions of nutrition, responsibility for health, interpersonal and emotional, and spiritual relationships (each dimension has 9 questions with a total score of 36) and two dimensions of physical activity and stress management (each dimension has 8 questions with a total score of 32) are scored. The range of the total score of behaviors that promote a healthy lifestyle is between 52 and 208, and a separate score is calculated for each dimension. Obtaining higher grades indicates the adoption of healthier behaviors and lifestyles.

### Statistical analysis

The data were described using mean and Standard Deviation (SD) or absolute and relative frequency. Kolmogorov-Smirnov test was used to evaluate the normal distribution. Baseline variables were compared using independent t-test and chi-square tests. Repeated measure analysis of variance was used to compare dependent variables between the two groups over time. The normality assumption was checked using Kolmogorov-Smirnov test. The compound symmetry assumption of variables

was assessed using Mauchly test of sphericity. The significance level of the tests was considered  $P < 0.05$ . All statistical analysis was performed using SPSS software version 22.

### 3. Results

Out of 268 participants, 132 were in the intervention and 136 were in the comparison group. sixty five percent of women in the intervention group had one to three children; This rate was 70.6 percent for the comparison group. More than half of the participants in both groups were married. Regarding to the level of education, 68.2% of the participants in the intervention compared to 75% of the comparison group had a diploma. Most of the participants were housewives (78.8% of the intervention group and 77.2% of the comparison group). **Table 1** shows the background characteristics of the participants in the intervention and comparison groups at the beginning of the study.

**Table 2** shows the changes in BMI, blood pressure and dimensions of the HPLP II questionnaire during the study periods. At baseline, there was no significant difference between the two groups in terms of baseline variables. Because of the significance of the Mauchly test of sphericity, the results of the Multivariate test were reported to determine the change of all studied variables over time. The multivariate test using RMANOVA showed that the six-month internet-based training program had a statistically significant effect on BMI, systolic and diastolic blood pressure, and all domain of HPLP II except for spirituality. In the comparison group, the trend was not significant for nutrition, Spiritual Growth, and interpersonal relation. The average BMI between the two groups after 3 months was not significantly different ( $P=0.08$ ), but in the intervention group after 6 months, it

**Table 1.** Background characteristics of the study participants

Variable	Mean±SD/No. (%)		P	
	Intervention Group	Comparison Group		
Age (y)	37.8±10.8	36.9±10.8	0.494	
Membership duration (y)	6.0±4.9	5.6±3.9	0.385	
Number of family members	3.8±1.1	3.7±1.2	0.384	
Education Level	Diploma	90(68.2)	102(75.0)	0.182
	College Education	42(31.8)	34(25.0)	
Job	Housewife	104(78.8)	105(77.2)	0.435
	Working	28(21.2)	31(22.8)	

Values are frequency (percent) unless otherwise indicated



**Table 2.** Within-group changes in score of study variables over the study period

Variable	Group	Mean±SD			p <sup>¥</sup>	p <sup>€</sup>
		Baseline	3 Months After the Intervention	6 Months After the Intervention		
BMI (kg/m <sup>2</sup> )	Intervention	27.4±5.3	27.1±5.1	26.3±5.7	<0.001	
	Comparison	28.0±4.5	28.1±4.4	28.2±4.3	<0.001	0.03
	p <sup>€</sup>	0.379	0.085	0.002		
Systolic blood pressure	Intervention	118.5±14.1	112.8±10.1	110.8±6.6	<0.001	
	Comparison	121.6±15.4	118.8±15.0	116.1±4.9	<0.001	0.001
	p <sup>€</sup>	0.093	<0.001	<0.001		
diastolic blood pressure	Intervention	76.7±12.5	72.7±7.6	69.6±0.9	<0.001	
	Comparison	79.0±14.1	76.1±12.1	74.8±0.4	<0.001	0.003
	p <sup>€</sup>	0.146	0.007	<0.001		
Health responsibility	Intervention	27.5±5.4	26.5±3.0	27.5±5.4	<0.001	
	Comparison	24.5±5.0	23.5±0.2	22.5±8.2	<0.001	0.001
	p <sup>€</sup>	0.067	<0.001	<0.001		
Physical activity	Intervention	18.3±5.2	19.0±5.1	19.1±4.5	<0.001	
	Comparison	17.5±4.8	16.5±5.4	15.5±5.4	<0.001	0.001
	p <sup>€</sup>	0.214	<0.001	<0.001		
Nutrition	Intervention	24.5±3.9	27.9±3.9	29.9±3.4	<0.001	
	Comparison	24.1±4.2	24.0±4.4	23.9±4.4	0.364	0.001
	p <sup>€</sup>	0.373	<0.001	<0.001		
Spiritual growth	Intervention	30.2±4.2	30.5±4.2	31.8±3.8	<0.001	
	Comparison	30.2±3.5	30.1±5.5	29.9±5.6	0.740	0.11
	p <sup>€</sup>	0.952	0.491	0.001		
Interpersonal relations	Intervention	28.2±4.4	28.8±4.2	29.7±4.6	<0.001	
	Comparison	27.2±4.3	26.7±4.7	26.6±4.7	0.094	0.001
	p <sup>€</sup>	0.082	<0.001	<0.001		
Stress management	Intervention	21.8±3.9	22.2±3.9	27.7±3.8	<0.001	
	Comparison	21.6±3.6	21.2±4.1	20.8±4.3	0.014	0.001
	p <sup>€</sup>	0.690	0.051	<0.001		



BMI: Body mass index, <sup>€</sup> P was reported from student t-test, <sup>¥</sup> P was reported from within-group RMANOVA stratified by group, <sup>€</sup> P was reported from between-group effects on marginal means.

decreased by 1.1 kg/m<sup>2</sup> (4% decrease in baseline BMI), while at the same time, BMI increased by 0.2 in the comparison group. The between-group comparison showed a significant difference in marginal mean between the two study groups ( $F_{1,265}=4.85$ ,  $P=0.03$ ,  $\eta^2=0.02$ ). The findings related to the blood pressure of the participants also showed a significant decrease in the systolic and diastolic blood pressure of both groups ( $P<0.001$ ). The average systolic and diastolic blood pressure during the study in the intervention group was significantly lower than the comparison group. Among the dimensions of

health-promoting lifestyle, the greatest effect of lifestyle intervention was found on the nutrition dimension ( $F_{1,266}=62.09$ ,  $P=0.001$ ,  $\eta^2=0.19$ ) followed by health responsibility ( $F_{1,255}=30.4$ ,  $P=0.001$ ,  $\eta^2=0.11$ ). The marginal mean score of the nutritional habits dimension in the intervention group (27.4, 95% confidence interval: 26.8-28.06) was significantly higher than comparison group (23.9, 95% confidence interval: 23.4-24.6) ( $P<0.001$ ).

#### 4. Discussion

A healthy lifestyle and keeping BMI in the normal range is of particular interest as one of the most important health-promoting behaviors in women. Maintaining a proper weight throughout a woman's life, especially in the middle years leading to menopause, can be considered a factor in maintaining the health of an important period in women's lives. Teaching these issues, especially through the Internet, with its ever-increasing expansion in the lives of the people of the world, can make this new and important technology practical in women's lives, in addition to its convenient and full-time availability. The findings of this community-based trial study, which was conducted for the first time in the country, showed that the main variables related to nutrition and promoting behaviors were influenced by the intervention. A healthy lifestyle in women includes improved weight, BMI, and blood pressure. These findings are similar to the results of the study by Tate et al. [15], McTigue et al. [18], Tokunaga-Nakawatase et al. [19] and Wadden et al. [20]. In the present study, the blood pressure in both groups has decreased significantly. It seems that the blood pressure control of the participants in the pre-test phase of this study by the researcher and announcing its level to them and answering the questions of the people who had high blood pressure regarding the solutions to reduce blood pressure in addition to physical activity that was posted on the site, triggered everyone to pay attention to this issue and possibly comply with the mentioned items. This result is consistent with the findings of Jahangiri's study [21]. The findings of Chen et al.'s study also showed a decrease in blood pressure in both the intervention and control groups, which was significant only in the intervention group [22]. Since controlling weight and blood pressure within a normal range is one of the most important criteria for health promotion, especially in Renan, it seems that the correction of these values in the present study is of particular importance.

The internet-based intervention of the present study has been effective on all aspects of the health-promoting lifestyle. The findings of Lara's study on a group of retired people in 2016, also showed that Internet-based intervention in the field of lifestyle behaviors has led to a significant increase in healthy lifestyle [23]. The results of this study showed that the eating habits of the intervention group participants have improved significantly. Among other studies that revealed similar findings, we can refer to Piernas's study, in which the consumption of sugar, red meat, and saturated fats was significantly reduced in the intervention group [24]. Fitzgerald's study also indicates a reduction in the con-

sumption of fatty snacks, an improvement in the type of oil and meat consumed in the intervention group ( $P < 0.01$ ) [25]. Poti also showed in his research that the consumption of fast food decreased significantly in the intervention group) [26].

The noteworthy point in the current study is maintaining optimal changes in lifestyle dimensions and especially healthy eating habits after 6 months. One of the concerns of health promotion experts in behavior change interventions is the reversibility of the initial behavior after the end of the intervention or after a short period of time, but as it can be seen from the findings of this study, healthy eating behaviors after 6 months of intervention, was in a favorable condition compared to baseline status. Among the reasons for this situation, we can point out the use of the bottom-up approach in empowering the community and non-face-to-face interventions and the impact of internet-based interventions. The effectiveness of Internet-based interventions has been proven in studies related to improving the lifestyle of obese people [20, 27], heart attack patients [28], and patients with non-alcoholic fatty liver disease [29].

In current study, the marginal mean difference between the two groups was significant for all dimension of HPLP II except for spirituality. These results are consistent with other studies conducted in the field of [internet] interventions on healthy lifestyle [30, 31]. The findings of the study by Tokunaga-Nakawatase et al. (2014) on people who had a history of diabetes in their family showed that during a six-month intervention, their weight loss led to improvement in clinical and laboratory findings, including cholesterol, blood sugar as well as their systolic and diastolic blood pressure. Also a significant increase was also reported in various dimensions of healthy lifestyle such as physical activity and their eating habits [19]. Another study was conducted by Lara in 2016 to investigate the effect of the intervention of health-promoting behaviors, healthy eating habits, physical activity and the significance of the social role of a group of retired people. They also showed a significant increase in all aspects of health promoting behaviors under the intervention as well as the number of social activities of the study participants after 8 weeks [23]. It seems that interventions based on a healthy lifestyle by increasing the awareness and empowerment of women regarding healthy nutrition and the role of physical activity in promoting their health, can indirectly affect other dimensions of a healthy lifestyle, including stress management and responsibility towards Health. Tsai's study in 2015 showed that all six dimensions of health-promoting lifestyle increased

significantly three months after Internet-based healthy lifestyle intervention in the intervention group. Also, the BMI of this group showed a significant decrease. In the control group, most of the investigated dimensions of lifestyle remained unchanged or showed a slight decrease [32]. The type of activity of the people participating in this study and passing various psychologies and counseling courses to fulfill their responsibilities as mental health assistants can be a justification for the high average score of the dimension of spirituality during the study in two groups. Similar findings were seen in other studies as well [33].

The practical significance of the results of this study is that considering the important role of a healthy lifestyle for women and its importance in the process of the onset of their menopausal symptoms and the necessity of health planning based on prevention, it is possible to use internet interventions to teach lifestyle Healthy life and proper nutritional habits addressed to different groups of women. In addition to being cost-effective, this type of intervention has the ability to use a training program for different groups and the lack of dependence of training on a specific time and place and people's permanent access to it.

#### **This study suffers from some limitation;**

The follow-up of the second stage after the intervention coincided with the beginning of the paddy season in Guilan province, and due to the presence of a number of participants in the agricultural fields, it was not possible to examine them at the appointed time. The follow-up of this number of people was done with a delay of one to two weeks.

Slow internet speed was another limitation that the participants of the study faced and they often expressed their dissatisfaction with this issue.

## **5. Conclusion**

The results of current study revealed that the Internet-based educational intervention program, using a bottom-up approach, has a favorable effect on the improvement of the lifestyle, weight loss and blood pressure of the participants. The findings of the present study show the possibility of using the new e-health technology in order to promote healthy lifestyle and eating habits in women. The voluntary nature of the studied women's activities can indicate their desire to be empowered and improve their lifestyle, which was a factor in the success of the study and obtaining favorable results in the intervention

group. It seems that paying attention to people's desire to carry out lifestyle interventions, instead of arbitrary decisions by health professionals on their behalf, is the issue that brought better health promotion results in the current conditions of the society. Paying attention to the bottom-up approach as an introduction to increase social participation of people can be more widely used by health promotion professionals.

## **Ethical Considerations**

### **Compliance with ethical guidelines**

This study has been registered in the Ethics Committee of Tehran University of Medical Sciences (Code: IR.TUMS.REC.1394.138416) and in the Clinical Trial Center of Iran (Code: IRCT2015041821445N2).

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### **Authors' contributions**

All authors have equally contributed in preparing the article.

### **Conflict of interest**

The authors declared no conflict of interest.

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