

# Comparison of the Effect of Virtual Education and Group-Based Education on Anthropometric Indices in Overweight and Obese Healthcare Women - An Educational Intervention Study

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## ABSTRACT

### BACKGROUND

Obesity is the main cause or the facilitator of many physical and psychological diseases worldwide, specifically in developing countries including Iran.<sup>(1,2)</sup> It is estimated that worldwide about 3% of total health expenditure is spent annually on the treatment of obesity related disorders.<sup>(3)</sup> We wanted to compare the efficacy of two methods of education including virtual education through Telegram messages and group discussion, on anthropometric indices in health care service providers suffering from overweight or obesity in Kermanshah.

### METHODS

This three-arm randomized control trial (RCT) was conducted on 102 overweight/obese female healthcare providers in Kermanshah. Using Excel RAND function, the eligible participants were randomly allocated into three groups; two intervention groups- Telegram message, and group discussion - and one control group. Anthropometric indices including height, weight, waist circumference (WC), and hip circumference (HC) were measured using standard instruments. Data was analysed with SPSS16 using Independent and Paired t-test, Chi-square, and ANOVA. The significance level was considered as  $p \leq 0.05$ .

### RESULTS

Participants' mean age was  $41.9 \pm 6.3$  years. Mean of BMI was  $29.8 \pm 3.8$  Kg/m<sup>2</sup>. The mean of weight, BMI and HC of the three groups were not significantly different before intervention; however, the mean of the changes for all three variables in the intervention groups were significantly different ( $p < .001$ ).

### CONCLUSIONS

Telegram and group discussion were effective on anthropometric indices of healthcare providers; however, comparing the mean change of variables in two intervention groups showed that Telegram method was more effective than group discussion in Weight, BMI, WC, and HC reduction ( $p < 0.05$ ).

### KEY WORDS

Anthropometric Indices, Health Education, Health Personnel, Obesity

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*DOI: 10.14260/jemds/2021/567*

*How to Cite This Article:*

*Siabani S, Zare F, Ashtarian H, et al.  
Comparison of the effect of virtual  
education and group-based education on  
anthropometric indices in overweight and  
obese healthcare women- an educational  
intervention study. J. Evolution Med. Dent.  
Sci. 2021;10(33):2778-2783, DOI:  
10.14260/jemds/2021/567*

*Submission 13-09-2019,*

*Peer Review 01-07-2021,*

*Acceptance 09-07-2021,*

*Published 16-08-2021.*

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## BACKGROUND

Obesity is the main cause or the facilitator of many physical, and psychological diseases worldwide, specifically in developing countries including Iran.<sup>(1,2)</sup> It is estimated that worldwide about 3% of total health expenditure is spent annually on the treatment of obesity disorders.<sup>(3)</sup> Overweight and obesity are the causes of 3.4 million deaths, and 4% of Disability Adjusted Life Years (DALYs) in the world.<sup>(4)</sup> The World Health Organization (WHO) estimated that in 2016, 39% of adults were overweight and 13% obese.<sup>(5)</sup> In Iran, the prevalence of overweight and obesity in women was 63.3% and 29.3% respectively.<sup>(6)</sup> Sedentary lifestyle and unhealthy dietary habits are important in the genesis of weight gain and obesity and there are possible interactions between the two sides of the equation in terms of aetiology and prevention.<sup>(7)</sup> Evidence shows that consumption of healthy foods such as fish, chicken, fruits and vegetables can reduce obesity. On the contrary, high intake of fatty foods and sweets materials can cause the obesity.<sup>(8)</sup> Also, unhealthy food choices and consumption can be predisposing factors for increasing the body mass index (BMI) and waist circumference.<sup>(9)</sup> Obesity, also, interferes various people's activities based on their social groups, especially those who have a formal job. A study showed that 45% of employees at government departments in Hamadan were overweight and 14% obese.<sup>(10)</sup> Overweight and obesity have been reported even in healthcare workers.<sup>(11)</sup> health care providers are responsible for managing health conditions of patients by providing appropriate health education and promotion recommendations.<sup>(12)</sup> Health care providers in the primary care setting and in health facilities are required to be educated by health education and promotion programs to be aware of own health benefits and can be a healthy role model for their clients.<sup>(13)</sup>

Performing educational programs targeting to weight loss, can increase the knowledge of healthy diet and improving nutritional behaviours.<sup>(14)</sup> Various educational methods are available to train the adults. Group discussion is one of the most widely used and accepted educational methods for changing attitude and enhancing the knowledge. Furthermore, group discussion can stimulate creative and critical thinking and developed the behavioural changes in individuals.<sup>(15)</sup> Electronic Health (E-Health) interventions are a group of methods which can be used to provide health information and improve health outcomes through some mobile based-applications such as Telegram Messenger.<sup>(16)</sup> However, the efficacy of many of these strategies such as Telegram recently is used for entertainment and News, still has not been examined to be a health education media.

The aim of present study was to compare the efficacy of two methods of education including virtual education through Telegram messages and Group discussion on anthropometric indices in health care service providers suffering from overweight or obesity in Kermanshah.

## METHODS

This study was a three-arm randomized clinical trial which was performed July to October 2018 on 102 female health carers employed by the Kermanshah Health Centre (KHC). The inclusion criteria were; age of 25-60, BMI equal or more than

25 Kg/m<sup>2</sup>, access to Telegram software (exclusively for Telegram Group), non-pregnant, non-lactation, agree to sign the consent form, and lack of underlying disease requiring a specific diet. In the present study using the results of the similar study, we needed 36 participants in each group to have an RCT with a power by 80% (type 2 error  $\beta=0.20$ ), 95% confidence ( $\alpha=0.05$ ). Our assumption to insert in sample size formula in addition to the mentioned  $\beta$  and  $\alpha$ , were  $\mu_1=28.85\pm 1.53$ ,  $\mu_2=27.58\pm 2.11$ ,  $\sigma_1=2.22$ , and  $\sigma_2=1.59$  according to the results of the study by Mirkarimi and colleagues,<sup>(17)</sup>. The total calculated sample size was 108 persons according to the three-arm RCT.

$$N = \frac{\left( Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)^2 (\delta_1^2 + \delta_2^2)}{(\mu_1 - \mu_2)^2}$$

It should be noted that six of the participants were excluded 2 weeks later because of unwilling to participate, immigration, and diagnosed with diabetes. Finally, 102 people were randomly allocated into three groups; intervention with Telegram messages (A), intervention by group discussion (B) and control group (C) with equal number of 34 people for each group (Fig 1). The randomisation was through Excel RAND function. In this study, a control group was used to compare the effect of training in intervention groups and to control the confounding factors in the study. Data gathering tool included two parts. The first was participants' demographic information including age, marital status, educational level, average monthly income, housing status, history of weight loss regime in the past year, and sensitivity to specific food.

The second part of data gathering tool was a checklist to record anthropometric measurements. Weight was recorded in light clothing by a digital weighing flat scale (Seca 760, Germany) with maximum 0.01 kg error. Accuracy of Weight scale was compared with other standard scales, twice a day. Height measured using the Roll-up measuring tape with wall attachment (Model 206) with 10 mm error. The measurements were while participant was in erect position against wall and without shoes, while the knuckles in normal condition and the buttocks, shoulders and heels were tangent to the wall and the head looking straightforward. Body mass index (BMI) was calculated by the dividing of weight in kg to height in meters squared overweight and obesity was based on standard.

Measurement of waist circumference (the lower edge of the ribs and above the pelvic edge) and hip circumference (the largest hip circumference) were measured using a non-elastic measuring tape. These measurements were performed twice, before and two months after the intervention. Individual with WHR more than the 0.86 is considered as at risk.<sup>(18)</sup> Two different educational strategies which used in this study were virtual training through Telegram messaging (group A). In this method, a health educator provided participants information on healthy diet and the consequences of obesity, and sent them to participants regularly each day, in a specific time that expected they check the message (afternoons). The other group was group discussion education (Group B). This group were divided into three small groups (sub-group). For each sub-group four sessions of 2 hours group discussion were performed. The third group was the control group which did not receive any educational program. After identifying the

study aim and the goals of educational programs, the context of educational programs using standard textbooks had been prepared. In addition, the texts and messages were approved by three nutrition expertise. The content of the educational materials was alike in the two intervention groups.

The study was approved by the ethics committee of Kermanshah University of Medical Sciences (KUMS.REC.1396.386), Iran. Before starting the data collection and intervention, a written informed consent form was received from the participants. The purpose of the study and the conditions of entry were described to all participants. People were aware that they were free to discontinue the study whenever they wished.

The data, based on the type of variables and relationships, were analysed using Independent and Paired t-test, Chi-square, and ANOVA in SPSS 16. The significance level was considered as  $p \leq 0.05$ .

### RESULTS

The mean age of the participants was  $41.92 \pm 6.31$  years, and the mean Body Mass Index (BMI) was  $29.8 \pm 3.8$  Kg/m<sup>2</sup>. Out of all the participants, 81.4% (n=83) were married, 74.5% (n=76) had bachelor's degree or higher education. The majority of the participants had their own house (84.3%, n=86). None of them had followed a certain diet for weight loss in the last 6 months (Table 1). More than 55% of women (n=57), used to take medication or nutritional supplements. Before intervention, none of variables were significantly different between the three groups.

As it is shown in table 2, mean of weight among three groups before intervention had no significant differences ( $p=0.791$ ). However, the mean weight in two intervention groups after education significantly decreased in compared with before intervention ( $p < 0.05$ ). the weight loss in telegram group was significantly higher than the group discussion ( $p=0.002$ ). The mean BMI before intervention was not significantly different among the three groups. The mean of BMI in group A before intervention was  $29.4 \pm 3.7$  Kg/m<sup>2</sup>, which after intervention declined to  $28.74 \pm 3.42$  Kg/m<sup>2</sup> ( $p < 0.001$ ). BMI in group B before and after intervention was  $30.13 \pm 3.83$  and  $29.93 \pm 3.9$  Kg/m<sup>2</sup>, respectively. The reduction was significant ( $p=0.011$ ). But in the control group, the mean weight and BMI changes were not significant ( $p=0.51$ ) and ( $p=0.54$ ). Reduction in BMI according to the mean changes was higher in telegram group than the group discussion ( $p=0.002$ ).

Mean of waist circumference which before intervention were not significantly differ in the three groups, after intervention significantly varied among three groups ( $p=0.021$ ). Also, the mean of hip circumference in the three groups which before intervention was not significantly different in the three groups, after intervention was significantly different ( $p < 0.001$ ), while intervention by telegram method was more effective than the group discussion ( $p < 0.001$ ). Also, WHR before intervention was not significantly different in the three groups, but after intervention was different in the three groups ( $p=0.035$ ), and in the groups of telegram and group discussion significantly

decreased ( $p=0.007$ , and  $p=0.017$ ) respectively. The WHR in the control group did not change significantly ( $p=0.059$ ).

Variables		Telegram Message Group (n=34) N (%)	Discussion Group (n=34) N (%)	Control Group (n=34) N (%)	Total (n=102) N (%)	p
Marital status	Single	6(31.58)	6(31.58)	7(36.84)	19(100)	0.937*
	Married	28(33.73)	28(33.73)	27(32.54)	83(100)	
Education	Undergraduate and lower	6(23.08)	13(50)	7(26.92)	26(100)	0.109*
	Bachelor's and above	28(36.84)	21(27.63)	27(35.53)	76(100)	
Household income	1-4 million	21(35)	18(30)	21(35)	60(100)	0.146*
	4 million and above	13(30.95)	16(38.1)	13(30.95)	42(100)	
Housing	Owner	28(32.56)	27(31.40)	31(36.04)	86(100)	0.381*
	rental	6(37.5)	7(43.75)	3(18.75)	16(100)	
Nutrition	Yes	22(38.60)	16(28.07)	19(33.33)	57(100)	0.342*
Supplement/medication	No	12(26.67)	18(40)	15(33.33)	45(100)	

Table 1. Frequency of Demographic Characteristics in the Three Study Groups

Variable		Group Discussion	Telegram Message	Control Group	p-Value	p-Value
		Mean ± SD	Mean ± SD	Mean ± SD	b	c
Weight (Kg)	Before	77.86±9.66	76.43±9.73	76.61±9.18	0.681	0.002
	After	77.34±9.81	74.81±8.96	76.70±9.45	0.355	
	p-value <sup>a</sup>	0.011	<0.001	0.450	-----	
Body Mass Index (Kg/m <sup>2</sup> )	Before	30.13±3.83	29.36±3.68	29.80±3.91	0.523	0.002
	After	29.93±3.85	28.74±3.42	29.83±4.02	0.358	
	p-value <sup>a</sup>	0.011	<0.001	0.538	-----	
Waist Circumference (cm)	Before	93.26±7.13	90.55±7.45	93.68±8.40	0.194	0.007
	After	92.74±6.86	88.81±7.07	93.76±8.81	0.21	
	p-value <sup>a</sup>	0.041	<0.001	0.758	-----	
Hip Circumference (cm)	Before	109.44±8.10	108.43±6.93	107.87±7.82	0.691	<0.001
	After	109.26±8.09	107.06±6.61	108.31±7.95	0.334	
	p-value <sup>a</sup>	0.517	<0.001	0.063	-----	
Waist-Hip Ratio	Before	0.8536±0.0532	0.8359±0.0569	0.8694±0.0596	0.056	0.670
	After	0.8502±0.0507	0.8305±0.0585	0.8663±0.0587	0.035	
	p-value <sup>a</sup>	0.017	0.007	0.059	-----	
	Mean of changes	-0.003±0.008	-0.005±0.011	-0.003±0.009	0.546	

Table 2. Anthropometric Indices of Participants before and after Intervention

<sup>a</sup> Paired T-test to compare before and after in each group.  
<sup>b</sup> ANOVA to compare mean and mean changes of three groups.  
<sup>c</sup> Independent T-test to compare mean changes of Telegram group and Group Discussion.

### DISCUSSION

The results of the present study showed that both educational interventions- Telegram and Group Discussion- have a positive effect on participants' anthropometric indices. Today one of the main causes of obesity is unhealthy lifestyle, such as inactivity and inappropriate food habits.<sup>(9)</sup> Considering the high costs of health care and the need to change the treatment approach to prevention, self-care and self-management in health and weight control have been emphasized.<sup>(19,20)</sup> In this regard, using modern educational technologies such as cyberspace to self-care can be prevented from wasting health costs. In the present study, educational intervention through telegram has led to significant improvements in anthropometric indices such as weight, BMI, and waist circumference of participants.

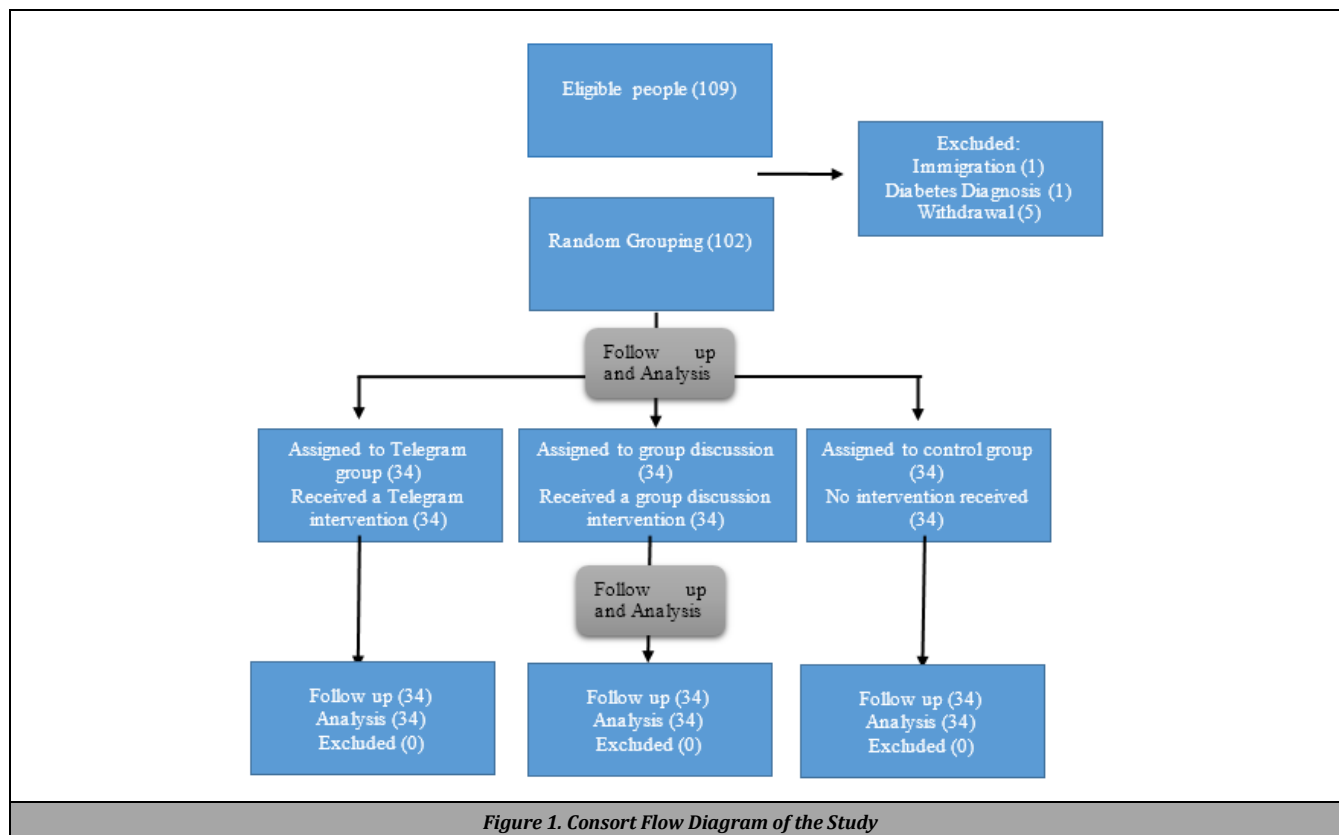


Figure 1. Consort Flow Diagram of the Study

These findings were consistent with the results of a similar study in which Participants received two short messages per day for two months (For correct nutritional habits, calorie intake, and weight management recommendations) and three months after an intervention significant decrease in weight and body mass index were observed in staff of Tehran University.<sup>(21)</sup>

The results of another study conducted in England showed that health messages through Short Message Service (SMS) reduced participants' weight, BMI, and WC significantly after 12 weeks intervention.<sup>(22)</sup> One study also, reported a significant decrease in weight, BMI and WC in a group of people; educated using telephone messaging every two weeks during a year.<sup>(23)</sup> In another study on obese people of South Korea, an educational intervention was conducted by sending a 3-month telephone messaging three times a week about Korea, an educational intervention was conducted by sending a 3-month telephone messaging three times a week about nutrition and management of obesity, and the results showed a significant reduction in the BMI but there was no significant difference in WC in both intervention and control groups.<sup>(24)</sup>

In this study, the content of the text messages was supportive and reminded, and included topics related to the correct pattern of nutrition and reduced calorie intake, and these strategies encouraged individuals to plan for the reduction of their anthropometric indicators. Weight changes were also sent weekly to the researcher. The difference between the current study and previous studies was that in previous studies participants were asked to respond to all the sent messages, while the present study did not require the participants to respond to messages and the message delivery report monitored by researchers examined using the cell

phone system. Also, in the current study a daily text message with attractive image was sent to individuals, while in previous studies people received other materials such as brochure in addition to text messages, in which case the accurate effect of reducing the indexes due to the text messages was unclear.<sup>(21,24)</sup>

In the present study, group discussion was the other educational method which had a significant impact on the improvement of anthropometric indices including the weight, BMI, and WC. A study in India indicated that intervention with group discussion was effective on anthropometric indices and more than half of individuals showed changes in weight, and BMI.<sup>(25)</sup> The results showed that the role of telegram message in terms of reducing anthropometric indices was significantly better than group discussion method. It seems that the reason for higher effect of telegram message was implementing the cognitive learning strategy of practice and repetition. In this method, with repetition of topics, subjective review, and sensitization of the participants to the self-care, content from short-term memory were transferred to long-term memory, in which case the sustainability of the lessons learned was considerable.<sup>(26)</sup> In the textual group, according to Paivio dual code theory, the accessory to visual writing enabled individuals to expand the images and memorize the lessons learned.<sup>(27)</sup>

Limitation of this study was the period between intervention and evaluations, because the study was a Master thesis and the student had time limitation for analysis and reporting of data. We suggest to the researchers who are interested in conducting such a study to consider a longer time interval after interventions to evaluate the outcome variables of anthropometrics indexes.

## CONCLUSIONS

The results of this study showed that both methods of group discussion and telegram have a positive effect on weight loss. However, the role of teaching through virtual education (Telegram) was more significant in terms of reducing anthropometric indices. This can be due to sending encouraging information about physical activity while it was applicable for the audiences. On the other hand, using media like Telegram is inexpensive than face to face classes, and needs less time. Therefore, such strategies are suggested to educate general population about healthy eating and lifestyle. In addition, considering the limitations of our study, we suggest future studies planned for a period of 8-12 months of follow up. This can provide us with a more reliable information on the effectiveness of these two educational strategies.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

Financial or other competing interests: All authors received grants from financially supported by Kermanshah University of Medical Sciences (Grant No. 96468).

Disclosure forms provided by the authors are available with the full text of this article at jemds.com.

The present article is extracted from the M.Sc. thesis in Health Education written by Farahnaz Zare; financially supported by Kermanshah University of Medical Sciences (Grant No. 96468). The researchers would like to thank all the participants in the study.

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