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# The effect of nutrition education course on awareness of obese and overweight female 1<sup>st</sup>-year High School students of Isfahan based on transtheoretical model of behavioral change

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## Abstract:

**BACKGROUND/AIM:** Today, the problem of obesity is a chronic condition that affects all age groups in developed and developing countries. Since adolescence is a transitional period and behavioral patterns formed in this period affect people in their adult years, attention to obesity and extra weight in this age group is more important than other groups. Therefore, this study aims to investigate the effects of nutrition education course on awareness of female 1<sup>st</sup>-year high school students of Isfahan based on transtheoretical model (TTM) of behavioral change.

**MATERIALS AND METHODS:** In this semi-empirical study, 64 female 1<sup>st</sup>-year high school students with weight problem were selected using nonpercent stratified sampling and divided into two control and test groups. Data gathering was carried out using researcher-made nutrition awareness and stages of change questionnaire whose validity and reliability was confirmed. Participants in the test group participated in a 2-month education with sessions every 2 weeks and received one brochure and 3 educational massages each week. Data were analyzed using independent *t*-test and Mann-Whitney test.

**RESULTS:** The results showed that the average nutrition awareness score of students in test group was significantly higher than control group after intervention. Students in test group were also in higher stages of change compared to control group after intervention.

**CONCLUSION:** The results show that TTM was effective in changing nutritional behavior in students.

## Keywords:

Awareness, health education, nutrition therapy, nutritional pattern

## Introduction

One of the chronic conditions with increased prevalence in developing and developed countries is the problem of obesity and extra weight which also known as welfare disease.<sup>[1]</sup> The World Health Organization (WHO) reports that the prevalence and problems caused by

obesity are comparable to those caused by malnourishment.<sup>[2]</sup> Studies show that obesity threatens all age groups including adolescents.<sup>[3]</sup> Since adolescence is a transitional period and behavioral pattern of adult years is created in this age, attention to problems of obesity and extra weight in this age is more essential than other ages.<sup>[4]</sup>

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Factors such as fatty foods, decreased physical activity, lifestyle changes, increased urbanization,<sup>[5,6]</sup> cultural preferences in different social classes who consider obesity as a sign of welfare and health,<sup>[7]</sup> hormonal changes, genetic factors, financial situation, life environment,<sup>[8]</sup> reduced sleep hours,<sup>[9]</sup> and concentration of supermarkets around schools<sup>[10]</sup> are among the reasons for increased obesity. Obesity and extra weight in adolescence years can lead to problems such as cardiovascular diseases, skeletal-muscle problems, some types of cancer, early death, repertory problems, secondary obesity, hypertension, psychological problems, type-2 diabetes, blood fat, liver and gallbladder diseases, infertility in women,<sup>[11]</sup> academic failure, social problems,<sup>[12]</sup> lower quality of life,<sup>[13]</sup> depression, reduced self-confidence,<sup>[14]</sup> sleep disorders, and anxiety.<sup>[8]</sup>

Best treatment is a timely prevention and one of the methods of prevention is to increase awareness through education.<sup>[15]</sup> Education about correct lifestyles and reducing the use of unhealthy foods, increase in physical activities, and problem-solving training are among effective methods for preventing obesity.<sup>[8]</sup> Flexibility and receptive nature of adolescents is another reason for using this age for preventive interventions. Correct education and using behavioral change models can lead to lifestyle changes and removal of unhealthy behavior which can mean a healthier life in the future.

Transtheoretical model (TTM) is a behavioral change model first introduced in 1980 for understanding behaviors related to addiction by Prochaska and Diclemente.<sup>[16]</sup> This model states that a change in behavior is not sudden but is instead a process, and different people are in different stages of change and readiness.<sup>[17,18]</sup> The probability of relapse and return to previous stages of change is a natural phenomenon that can happen during different stages and must not be excluded because people can only enter the next stages of change through experience and by gaining the necessary skills. TTM model uses interventions and proper information to facilitate readiness and the best method of achieving this readiness.<sup>[19]</sup>

TTM consists of 5 stages and 3 moderators which include:

1. Precontemplation stage: People in this stage have no plans to change their behaviors currently or in the next 6 months. These people might not have enough information about the consequences of their unhealthy behavior or might have lost their desire to change due to previous failed attempts at change.<sup>[20-22]</sup>
2. Contemplation stage: In this stage, people are aware of their problem and have obvious plans to change in the next 6 months. However, no action has yet been taken. The key point of this stage is that people start

to seriously consider opinions for and against solving the problem. People in this stage are familiar with the advantages of change but are worried about financial and emotional costs of change.<sup>[20-22]</sup>

3. Preparation stage: In this stage, people want to change the behavior in the near future (30 days or less) or might have even taken some small steps for change.<sup>[20-22]</sup>
4. Action stage: In this stage, people create serious changes in their behaviors, experiences, lifestyle, and environment to correct their behavior and will work on the change (for about 6 months) but have not yet reached their goals.<sup>[20-22]</sup>
5. Maintenance stage: In this stage, people attempt to prevent a relapse and stabilize their achievements in the previous stages. In this stage, people attempt to improve their self-confidence to continue their new lifestyle. The length of this stage depends on the behavior in question but is often longer than 6 months.<sup>[20-22]</sup>

Other than 5 stages of change, there are 3 moderators in TTM for transfer between stages of change and changing the timing of change which includes: Process of change,<sup>[23]</sup> decisional balance,<sup>[24]</sup> and self-efficient.<sup>[24]</sup> The reason for selecting TTM for the current study is its comprehensiveness, completeness, cost-effective nature, and shorter time of success.<sup>[25]</sup> Since this model can determine people's position in the stages of change, it can help achieve prevention in the study population. TTM has measurable theories and structures which gives it a strong infrastructure.<sup>[26,27]</sup> By determining people's position in the stages of change, it will be possible to plan a timely and suitable intervention. Wright, Velicer, and Prochaska in 2009 achieved positive and significant results in investigating the predictive power of TTM in dietary fat intake.<sup>[28]</sup> Khezeli, Ramezankhani, and Bakhtiyari in 2012 also reported positive results about the effect of education on nutritional knowledge and stages of change for using fruits and vegetables in elderly people based on TTM.<sup>[5]</sup>

The goal of this study is to use TTM to improve nutritional awareness of female obese and overweight students in high schools of Isfahan. TTM has not been previously used for increasing nutritional awareness in Iran despite the fact that obesity presents an important and immediate problem. The effectiveness of TTM has been proven to work in this area,<sup>[28]</sup> and therefore, attention to this model can be of great importance.

## Materials and Methods

This was an intervention study which was carried out using semi-empirical method (pretest, posttest with control and experiment groups). The study population consisted of all female obese of overweight 1<sup>st</sup>-year

high school students in the city of Isfahan. Based on the recommendation of education department district 3 of Isfahan, one school was selected for the study. The sample size was calculating using the following equation with confidence limit of 95% and nonpercent stratified sampling to be 64 students. The students were randomly divided into a 32-individual experiment and a 32-individual control group. To this end, a list of students' names were sorted in descending order based on their BMI and even numbers were put in one group and odd numbers in another group.

$$n = \frac{NZ^2(1-P)}{Nd^2 + Z^2P(1-P)}$$

Students' heights were measuring using a measuring tape, and their weights were measured using a digital scale. Autoplus 2007 software published by the WHO was used for exact calculation of students' BMI.

To measure the nutritional awareness of students, a nutritional awareness questionnaire was used. This questionnaire consists of 15 items, with 12 items having 4 options and 3 questions having 2 options, and the students were asked to select the most correct answer for each item. After filling the questionnaire, the number of correct answers for each student were counted and reported as nutritional awareness score of that student.

To determine the stages of change, a researcher made questionnaire created with the help of supervisor and consultant faculty members were used. This questionnaire consisted of 6 questions. According to the theory of TTM which states that there are five stages of change, each question had 5 options. Each of these options represented one of the stages of change including precontemplation, contemplation, preparation, action, and maintenance. People with scores between 1 and 12 who were in one of the first stages of change (precontemplation, contemplation, and preparation) were considered as potential members of experiment and control groups. The validity of tools was confirmed by nutrition experts, and their reliability was determined using Cronbach's Alpha coefficient (0.86 for nutritional awareness questionnaire and 0.85 for stages of change questionnaire). Students were assured that all collected information is fully confidential and that they can refuse to continue the study at any time.

## Results

This study was carried out to determine the effect of nutritional educational sessions on awareness of 1<sup>st</sup>-year female high school students in city of Isfahan based on TTM and led to the following results.

Independent *t*-test showed that there was no significant difference between nutritional awareness score of participants in control and experiment groups ( $P = 0.55$ ) before intervention. However, after intervention, the awareness score of experiment group was significantly higher than control group ( $P = 0.03$ ). Paired *t*-test showed that the average nutrition awareness score of students in experiment group after intervention was significantly higher than their score before intervention ( $P = 0.01$ ), but no significant difference was observed in control group ( $P = 0.67$ ) [Table 1].

Mann-Whitney test showed no significant difference between frequency distribution of stages of change of both groups before intervention ( $P = 0.97$ ) but after intervention students in experiment group were in higher stages of change ( $P = 0.02$ ). Wilcoxon test results showed that students of experiment group were in higher stages of change after intervention compared to before intervention ( $P = 0.006$ ), but no difference was observed in control group before and after intervention ( $P = 1$ ) [Table 2].

## Discussion

The results of this study showed that after intervention, the average nutrition awareness score of experiment group increased. Nascimento, Silva, and Ribeiro Nascimento *et al.*,<sup>[29]</sup> in their study, evaluated and compared the effect of nutritional interventions in adolescents and adults. Their results showed an increase in nutrition awareness of both groups with is similar to the results of the current study.<sup>[29]</sup> Shojaei *et al.* investigated the effect of diet education based on health belief model on experiment and control groups. Their results, similar to the results of current study, showed an increase in nutritional knowledge of experiment group.<sup>[30]</sup> One of the reason for these similar results can be the increase in nutritional knowledge during intervention due to the availability of proper information and education.

The results of this study were also similar to the results reported by Malverdy and Kazemi<sup>[31]</sup> who investigated

**Table 1: Average nutritional awareness score of students (from a total of 100) before and after intervention in both experiment and control groups**

Time	Intervention group		Experiment group		Independent <i>t</i> -test	
	Mean	SD	Mean	SD	<i>t</i>	<i>P</i>
Before intervention	45.9	11.4	44.2	10.4	0.59	0.55
After intervention	57.1	11.6	45.5	13.3	2.18	0.03
Paired <i>t</i> -test						
<i>t</i>	2.67		0.43			
<i>P</i>	0.01		0.67			

SD=Standard deviation

**Table 2: Frequency distribution of stages of change in students before and after intervention in both experiment and control groups**

Time	Obesity stages of change	Intervention group, n (%)	Experiment group, n (%)	Z	P
Before intervention	Precontemplation	1 (2.9)	1 (3.2)	0.04	0.97
	Contemplation	3 (8.6)	4 (12.9)		
	Preparation	16 (45.6)	12 (38.7)		
	Action	15 (42.9)	14 (45.2)		
	Maintenance	0	0		
After intervention	Precontemplation	0	1 (3.2)	2.36	0.02
	Contemplation	1 (2.9)	4 (12.9)		
	Preparation	11 (31.4)	12 (38.7)		
	Action	18 (51.4)	14 (45.2)		
	Maintenance	5 (41.3)	0		
Wilcoxon test	Z	2.75	0		
	P	0.006	1		

the stages of change in nutritional behavior and physical activity in pregnant women based on TTM and perceived barriers.<sup>[31]</sup> The reason behind people in experiment group being in higher stages of change is that the information they receive during intervention means that they have more desire to change their behavior and keep these changes which can be the reason for these similar results.

### Conclusion

It's better to Select people based on the stages of change, because according to TTM people in the first three stages of change (precontemplation, contemplation, and preparation) are more effective in acquiring correct information and behaviors and are also more active in the process of information seeking and changing their lifestyles.

This study used one of the high schools in city of Isfahan as its study location, and therefore, led to more limited results which can be one of the weaknesses of this study. The reason for this decision was the high number of high schools in city of Isfahan and limited time and scope of the study. Therefore, it is suggested to conduct similar studies with wider scopes and during longer periods of time.

It is suggested that the present study is conducted on a wider scale and grouped together by a clinical librarian, nutritionist, and clinical psychologist. Clinical librarian, as an interface between the two other members and the community, transforms nutritional information provided by a nutritionist into plain language and provides the statistical community with it. Clinical psychologist helps to better understand the auxiliary pattern of a clinical librarian in helping to better understand the infrastructure of this template that may have been hidden.

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### Conflicts of interest

There are no conflicts of interest.

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