



The Effectiveness of a Nutritional Counseling Program on the Anthropometric Measurements of Female Students at Al-Qunfudhah University College

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ABSTRACT

The study aimed to know the effect of a nutritional guidance program on anthropometric measurements, which is an experimental study on the female students of the Department of Family Education at Al-Qunfudhah University College - Umm Al-Qura University - Saudi Arabia. The researcher conducted a survey study of the nutritional and health status of 107 female students from the Department of Family Education - Umm Al-Qura University. Then, a purposive sample of 20 (9 underweight, 11 obese) students was selected, who were diagnosed as suffering from nutritional problems, were carried out from the research community according to nutritional status. They were conducted from the research community by nutritional status. The researcher used the experimental method, one-group design, and multiple measurements. The experiment consisted of distributing a pre-designed questionnaire to the listed subjects from April 1 to July 2021. An educational food program was presented, and body mass index measurements were taken (height in centimeters, weight in kilograms, waist, and buttocks circumference in centimeters), continued for three months. Four measurements were taken, the first before the experiment, the second after the first month of the experiment, the third after the second month of the experiment, and the last fourth after the third month of the experiment. Then the data was analyzed using a repeated measurement binary analysis of variance, and the results showed that the calculated p-value for each of the weight, waist circumference and buttock circumference, are 16.811, 5.015, and 9.151, respectively, which is a function at the level of 0.001, 0.038 and 0.007, which He indicates that the experiment was effective in treating nutritional and health problems. The researcher recommends using the nutritional program to treat nutritional and health problems.

Keywords: counseling program, nutritional status, anthropometric measurements, female students at the University College - Al-Qunfudhah, Saudi Arabia.



Introduction

With societal developments, the speed of economic and social changes and the general preoccupation with social media, and societal conditions, the girl often finds that she is in a nutritional problem, and many girls may try to use non-scientific methods to treat these problems, but they fail on an ongoing basis, and the researcher has noticed this phenomenon, the idea to design a nutritional counseling program based on the physical measurements of a group of female students. The nutritional education programs as one of the health education programs aimed to improves health and nutritional status. It is one of the recommendations for a healthy diet that can prevent nutritional deficiencies, reduce the incidence of other chronic diseases, and reduce excess weight, (Baldasso et al., 2016), (Arunachalam and Maheswari, 2020), (Nehme et al., 2021) .

One of the goals of nutritional education a program is provides establish healthy eating habits, especially in childhood. The priority of concerning of building good healthy eating habits from childhood is the first stage of healthy life through lifespan. Wherein, these eating habits are linked to the risk of non-communicable diseases) (Azzeh et al., 2017) , (Rana et al., 2021).

In developed countries, obesity has become a serious health problem, and its prevalence has increased dramatically for several decades due to both environmental and genetic factors, (Cunha et al., 2013).

The World Health Organization Regional Office for the Eastern Mediterranean defined obesity as an abnormal accumulation of fat that may cause health consequences, while BMI is defined as a weight-for-height indicator commonly used to classify underweight, obesity and overweight, and is defined as the weight in kilograms divided by the square length in meters (kg/m^2). Obesity could be identified by body mass index as 25 for overweight and stage of obesity start from 30 range and more. Overweight and obesity are potent risk factors for cardiovascular disease and type 2 diabetes that contribute to premature deaths. One of the most important causes of obesity is excessive intake of calorie-rich foods, poor eating behaviors and lack of physical activity (Kim et al., 2017).

According to a 2016 report by the World Health Organization, the prevalence of obesity worldwide nearly tripled between 1975 and 2016, with more than 1.9 billion people aged 18 years and over, 650 overweight. One million of these adults are obese, of whom about 13% of adults are overweight (39% of men and 40% of women), and the world is obese in general, about 13% of adults (11% of men and 15% of women. The World Health Organization Regional Office for the Eastern Mediterranean, reports that the highest levels of obesity and overweight are increasing in the Eastern Mediterranean Region and the countries in which they are located are Saudi Arabia, Jordan, Bahrain, Egypt, United Arab Emirates and Kuwait. The prevalence of overweight and obesity in these countries ranges from 69% to 77% in men and from 74% to 86% in women.



According to the data of the World Health Organization, the general prevalence of obesity was estimated for some countries, and it was the lowest in Sudan (8.6%), Syria 27.8%, Oman (27%), Iraq 30.4%, the United Arab Emirates 31.7%, and the highest percentage was in Saudi Arabia (35.4%).

During the past twenty years, the Kingdom of Saudi Arabia has witnessed an unprecedented development in all aspects of life and the spread of fast-food restaurants, and the provision of many types of unhealthy foods, which led to the emergence of chronic diseases such as heart and blood diseases, cancer, as well as diseases related to nutrition, (Khayri et al.,2016).

The report of the World Health Organization, (2016) stated that in 2014, the Kingdom of Saudi Arabia showed the highest rates of 68.2% of the prevalence of overweight among adults, while the prevalence of obesity reached 33.7% and the highest prevalence was among females (39.5%) of males (29.5%), and the percentage of adults with Obesity in Saudi Arabia is 2.6 x higher than the world population (33.7% vs. 13%). The report of the World Health Organization also mentioned that the prevalence of obesity and overweight in Saudi Arabia among the age group 18-21 years among males (23%) and females (30%),(Alshahrani, & Chandramohan, 2017). As for the prevalence of obesity and overweight in some regions in Saudi Arabia, it ranges among all age groups, in the Jazan region (11.7%) and in Hail (33.9%), and the prevalence of overweight for females is 28.4%, while the percentage of males was higher (30.7%), and as for the women's group (23.6%) more than men (14.2%) are obese, (Al Othaimen et al 2007).

Thinness "underweight" is the reduction in body fat percentage as a result of a long diet, (Mak & Tan , 2012) . Wasting is the low weight in relation to height in children, as stated by the World Health Organization, as it suffers from undernourishment and underweight. Wasting is considered one of the most powerful factors influencing an indicator of malnutrition in a child, as it causes a very large loss of muscle tissue and body fat. One of the causes of thinness in teenage girls is fear of excess weight and body image, (Shayan, et al 2020) . One of the dangers of being thin is that it leads to a lack of nutrients and energy, which leads to malnutrition diseases such as osteoporosis, anemia, anorexia nervosa and menstrual disorders in girls, (Mase, et al 2013).

The prevalence of malnutrition among children in developed, transitional and least developed countries. In the United States it was 1.3%, Brazil 2.2%, Yemen, and Bangladesh 40% of moderate underweight. In Egypt, the prevalence of moderate underweight was 5.4%. Wasting rates in Nigeria reached 11.2%. Moderate stunting rates in Oman reached 12.9%, (Alshammari, et al 2017). In Saudi Arabia, the prevalence of underweight in males is higher than in females. Moderate underweight reached 6.9%, wasting 9.8%, and moderate stunting prevalence was 10.9%, (El Mouzan et al 2010).

Anthropometrics are a set of direct quantitative standards for the external dimensions of the body. They are indirect measures and are used to make up the human body.



They include, BMI, weight, height, skinfold thickness and body circumference (hip, waist, and limbs), (Rumbo, et al 2021). With the importance of considering race, gender and age, as main factors when measuring, (Singh, et al 2013).

The aim of this study was to improve the physical condition and to know the effect of the program provided by knowing the physical parameters.

Methods

study design

The experimental study was conducted on the female students of the Department of Family Education at Al-Qunfudhah University College - Umm Al-Qura University - Saudi Arabia. The data was collected by means of a questionnaire. The experimental method was used, one-group design and multiple measurements. The experiment consisted of distributing a pre-designed questionnaire on the listed topics.

It was between April 30th and July 30th, 2021. A nutritional education program was also presented, which consisted of presenting three (remotely) lectures on the (Sisco Webex meetings) program.

The questionnaire was designed, then refereed by specialists, and then it was applied electronically, after it was approved by the competent authorities. The questionnaire was divided into two axes. The first axis includes social and demographic characteristics (age in years, place and type of residence, number of family members, and marital status). As for the second axis It includes physical measurements (weight in kilograms, height, waist circumference and buttocks / in centimeters).

Then the questionnaire was applied (before) the experiment and then repeated monthly (for the post-test), and the follow-up was taken to take anthropometric measurements (weight, waist circumference and buttock circumference) for a period of 4 months for the intended sample.

As for the nutritional education program, it contained three lectures, which aimed to modify food behavior, give new information to knowledge, and change some concepts. The lectures included the following:

The first lecture is information about nutrients, their types, sources, and functions of each element, with a focus on eating vegetables and fruits and drinking water.

The second lecture on the factors and causes of weight gain and loss, encouraging physical activity, the third lecture on planning, designing and calculating diets for weight gain and weight loss, calculating calories, determining and selecting quantities from food groups and their alternatives, focusing on the importance of eating breakfast, increasing the number of meals per day and distribute it to more than three meals a day with snacks, knowing how to take physical measurements and calculate body mass index.



Sample size and selection

The sample was randomly selected for 107 participating female students, then 20 female students were selected for the purposive sample (9 underweight, 11 obese) from among the participants to conduct the post-test, out of the total number of (270 female students), through the following equation:

$$n = \frac{z^2 P(1-P)}{d^2} \quad (\text{Pourhoseingholi et al,2013}).$$

Data analysis and presentation

Two-Way Repeated Measure ANOVA, data were analyzed using the Statistical Package for Social Sciences, (SPSS ver 21). Tables and graphical presentations of the results were provided by Excel Microsoft Office Software.

View results

This study aims to reveal the effectiveness of a nutritional counseling program on anthropometrics for a group of female students in treating health and nutritional problems, according to the variables of weight, buttocks circumference, and waist circumference. Then the data was analyzed using repeated measurement analysis of variance. The analysis showed the following results:

Show the result of the first hypothesis

The first hypothesis states that the anthropometric nutritional counseling program improves weight for both the “underweight” and “obese” categories. Then, repeated measurement of two-way analysis of variance was used, and Table (1) illustrates this.

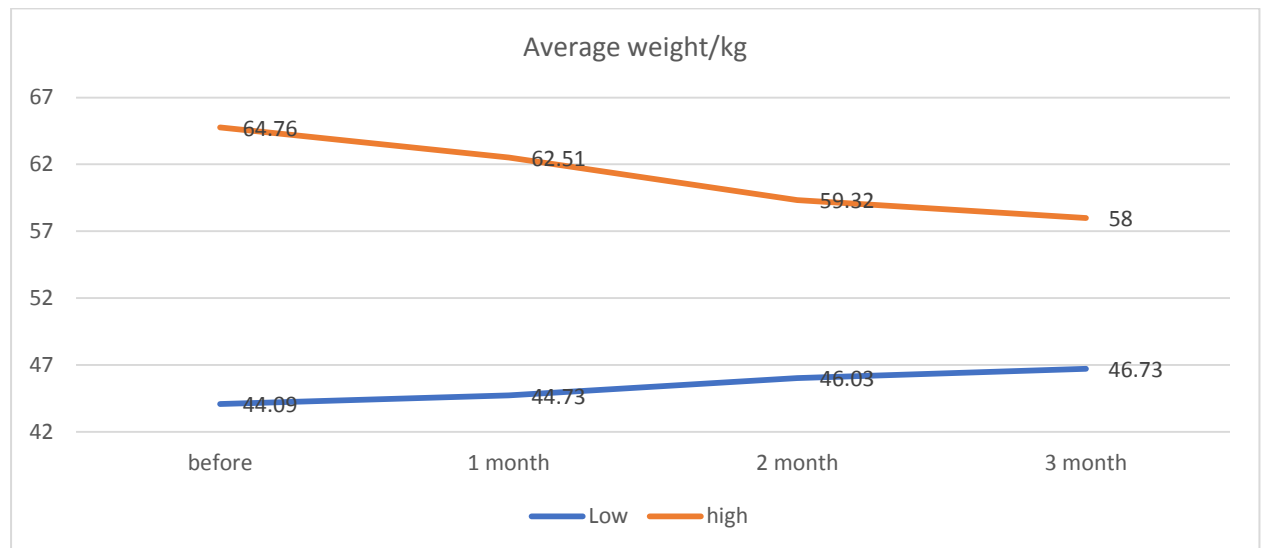
Table 1 bivariate analysis of repeated measurement of weight before, during, and after the experiment

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Result
factor1	50.028	3	16.676	3.176	.031	There are differences
factor1 * group	264.807	3	88.269	16.811	.000	There are differences
Error(factor1)	283.539	54	5.251			

From Table (1) it appears that the S -value of the interaction of both the period and the experimental group (underweight) and (obesity), in the weight averages is 16,811 functions at the 0.001 level, which indicates that there is an interaction between each of the time period and the group, and to determine the direction of the differences the researcher relied on averages and Figure (1).

**Table 2 The averages of the two groups (underweight) and (obesity) during the four measurement periods**

Group		Time	Before	1 month	2 months	3 months
1	Low Weight	Mean	44.09	44.73	46.03	46.73
		Std. Deviation	5.89	5.02	4.93	6.69
		No	11	11	11	11
2	High Weight	Mean	64.76	62.51	59.32	58.00
		Std. Deviation	6.76	6.55	7.01	7.55
		No	09	09	09	09

Figure 1 The average weight of the two groups (underweight) and (obese) in the four measurements

From Table (2) and Figure (1), it appears that the averages of the obesity group changed from 64.76, 62.51, 59,32 and 58 in each of the pre-measurements, after the first month, after the second month, and after the third month, respectively. Which indicates that there is a continuous improvement in weight, and regarding the underweight group, their averages or weight were 44.09, 44.73, 46.09, 46.73 in each of the pre-measurements, after the first month, after the second month, and after the third month, respectively. Which indicates that there is an improvement in weight continuously.

Show the result of the second hypothesis:

The second hypothesis states that the anthropometric nutritional counseling program improves waist circumference for both the “underweight” and “obese” categories. Then a repeated measurement of two-way analysis of variance was used, and Table 3 illustrates this.



Table 3 bivariate analysis of repeated measurement of waist circumference before, during, and after the experiment

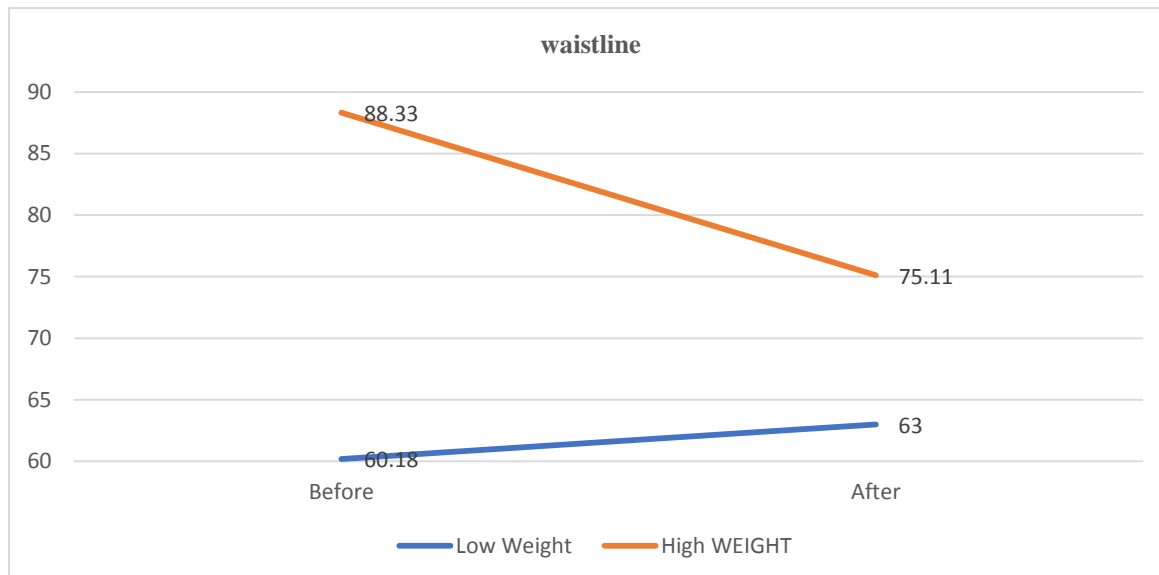
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Time	267.904	1	267.904	2.110	.164
time * group	636.804	1	636.804	5.015	.038
Error(time)	2285.596	18	126.978		

From Table (3) it appears that the S-value of for the interaction of each of the time period and the experimental group (underweight) and (obesity), in the average waist circumference is 5.015 function at the level of 0.038, which indicates that there is an interaction between each of the time period and the group, and to determine a trend The differences the researcher relied on the averages of waist circumference before and after the experiment, and then figure (1) according to them, and as in Table 4.

Table 4 Averages of waist circumference for the two groups (underweight) and (obese) before and after the experiment

Group	N	Before		After	
		Mean	Std. D	Mean	Std. D
Low Weight	11	60.18	10.59	63.00	6.21
High Weight	09	88.33	39.78	75.11	18.96
All	20	72.85	30.53	68.45	14.47

Figure 2 Average waist circumference before and after the experiment



From Table (4) and Figure (2), it appears that the averages of the obese group changed their waist circumference from 88.33 to 75.11 before and after the experiment, respectively. While the underweight group changed their average waist circumference from 60.18 to 63 before and after the experiment, respectively, which indicates that there is an improvement in their waist circumference continuously.

Show the result of the third hypothesis:

The third hypothesis states that the anthropometric nutritional counseling program improves hip circumference for both the “underweight” and “obese” categories. Then a repeated measurement of two-way analysis of variance was used, and Table 5 illustrates this.

Table 5 bivariate analysis of repeated measurement of hip circumference before, during, and after the experiment

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.			
Time	403.139	1	403.139	6.514	.020			
time * group	566.289	1	566.289	9.151	.007			
Error(time)	1113.929	18	61.885					

From Table (5) it appears that the value of S-value for the interaction of both the time period and the experimental group (underweight) and (obesity), in the average hip

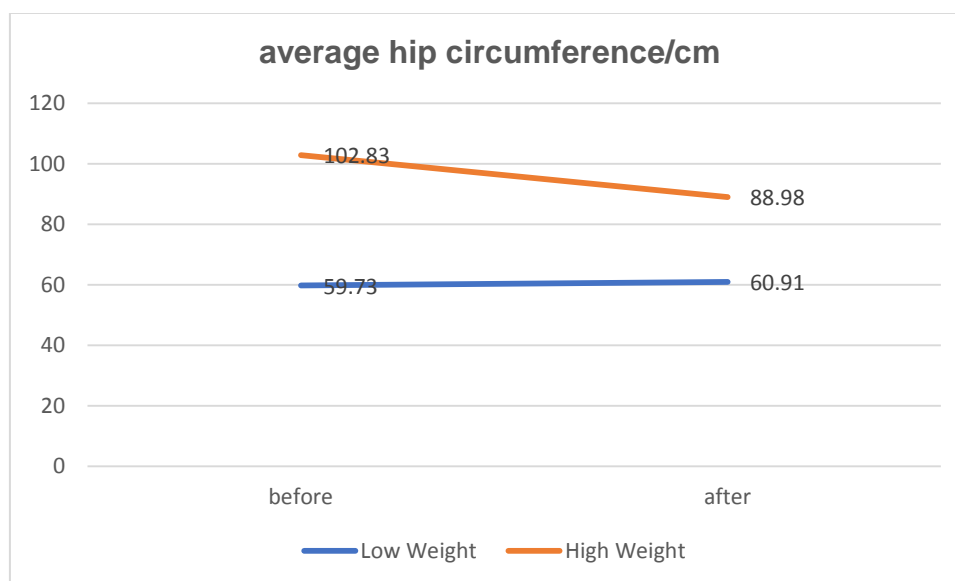


circumference is 9.151 at the 0.007 level, which indicates that there is an interaction between each of the time period and the group, and to determine a trend The differences, the researcher relied on the averages of waist circumference before and after the experiment, and then according to them, and as in Table 6 Figure (3).

Table 6 Averages of hip circumference for the two groups (underweight) and (obese) before and after the experiment

Group	N	Before		After	
		Mean	Std. D	Mean	Std. D
Low Weight	11	59.73	16.25	60.91	6.74
High Weight	9	102.83	38.17	88.89	28.83
All	20	79.13	35.17	73.50	26.03

Figure 3 Averages of hip circumference before and after the experiment



From Table (6) and Figure (3), the averages of obesity group for the hip circumference variable from 102.83 to 88.98, before and after the experiment, respectively. While the underweight group changed their average buttocks from 59.73 to 60.91 before and after the experiment, respectively, which indicates that there is an improvement in the circumference of the buttocks continuously, for both groups.



Discussion

This study represents to reveal the effectiveness of a nutritional counseling program on the physical measurements of a female student's group. The program aims to improve the physical condition and familiarity the impact of the presented program by providing information of the physical measurements (weight, waist circumference and hip circumference). The result of the first hypothesis, which states that there are statistically significant differences in achieving a systematic improvement in weight for members of the "underweight" and "obese" groups, and the average weight was 16,811 functions at a function level of 0.001 before, during and after the experiment, which indicates that There is a correlation between program effectiveness and weight levels, And this showed the average weight of the obese group that changed from 64.76, 62.51, 59, 32 and 58 for the pre-trial experiment, for the specified time period, respectively, which indicates an improvement in weight during the follow-up period, as well as for the underweight group, their average weights were 44.09, 44.73, 46.09, 46.73 for the experiment tribal, respectively, for the specified period of time, which indicates that the program is effective in improving weight during the follow-up period for the two groups. By themselves, these results indicate the effectiveness of the program and the achievement of objectives.

This is in agreement with the results of (Aldisi et al., 2020), which confirmed the effectiveness of weight loss programs during the follow-up period for a group of (obesity) and that nutritional intervention (balanced diet and ideal protein diet) to lose weight is more responsive to improving anthropometric measurements, as well as the study by (Mimish, 2014) , who confirmed that education and knowledge have a major role in improving health status, and this is the best evidence through programs that reduced the spread of obesity, which was implemented by the Ministry of Public Health in Saudi Arabia, where it focused on behavioral changes and awareness to reduce the spread of obesity in Saudi Arabia.

The study literature stated that the main cause of obesity and weight gain is the dietary pattern and lack of knowledge and eating habits, not the lack of nutrients, and this agrees with the study

{(Ali et al., 2017, Doshi et al., 2017, and Alshammari et al., 2017,)}, who mentioned that the causes of obesity and weight gain due to the lack of balance between the calories consumed is much higher than the calories consumed, which is due to an imbalance in the diet, as well as the diet high in carbohydrates and fats. Malnutrition (underweight) is due to insufficient consumption of daily requirements and lack of awareness of nutrition, as agreed with a study, (Bashatah,2020) , which stated that a third of the participants suffer from malnutrition due to lack of food intake and lack of awareness.

Through the presented study program, which shows that breakfast is the most important morning meal of the day because it encourages a healthy diet. The results of study agree with a study



(Musaiger, 2011) , who show that, one of the causes of obesity is skipping breakfast, and adults of them had a larger waist circumference because of skipping breakfast in childhood for the participants.

The result of the second hypothesis, which states that there are statistically significant differences in achieving a regular improvement in waist circumference for both the “underweight” and “obesity” categories. The results of the average waist circumference are 5,015 indicatives at the 0.038 level before, during and after the experiment, which It indicates that there is a correlation between the effectiveness of the program and the levels of waist circumference, and that the averages of the obese group change their waist circumference from 88.33 to 75.11 before and after the experiment, respectively. While the underweight group changed their average waist circumference from 60.18 to 63 before and after the experiment, respectively, indicating that there is a continuous improvement in their waist circumference during the follow-up period, which indicates that there is an improvement in the waist circumference of the participants continuously during the specified period. These results indicate the effectiveness of the program in achieving the goal for which it was set. Where this study indicated the impact of the presented program because of its importance as educational programs or nutritional education programs that work to raise nutritional and health awareness, as this study agreed with the study of (Mahmoud & Taha, 2017) who mentioned that it is possible to provide educational programs for university students to modify healthy eating habits and to increase awareness of healthy food. The observed results also agreed with the study of (Al-Qahtani, 2016) who appointed that, students in Saudi Arabia have a lifestyle and dietary habits like the general population, even if the participants were medical students.

The study literature stated that, the goals of nutritional education programs are to improve health and nutritional status.

In another study by (Baldasso et al., 2016) who indicated that, extension programs and nutritional intervention plays an important role in improving health and dietary patterns. As well as the study by (Sogari et al., 2018) who confirmed that, for students to choose the best food for their longevity, it is to provide them with the necessary skills and make them more aware of how to cook, better plan meals, and choose the right healthy diet.

It was mentioned in the presented study program to encourage the practice of physical activity because of its importance, as the study agreed with the study of (Hall et al., 2016) , the educational programs promoted regular physical activity and healthy habits, which achieved positive BMI results after 3 months of the program.

The third hypothesis, which states that there are statistically significant differences for both groups of underweight and overweight for the hip circumference, the results of the average hip circumference are 9,151 functions at the 0.007 level before, during and after the experiment, which indicates that there is a correlation between the



effectiveness of the program And the levels of hip circumference, and between that are averages, and the averages of the obesity group changed the hip circumference from 102.83 to 88.98 before and after the experiment, respectively. While the underweight group changed the average hip circumference from 59.73 to 60.91 before and after the experiment, respectively, which indicates that there is a continuous improvement of the hip circumference during the follow-up period, which indicates that there is an improvement in the waist circumference of the participants continuously during the specified period. These results indicate the effectiveness of the program in achieving the goal for which it was set agreed with study of (Aldisi et al., 2020) , who shows the significant decrease in the physiological measures of weight, waist circumference and hip circumference through the effectiveness of the program provided through the balanced diet and the ideal diet for weight loss with protein.

The importance of eating meals regularly and increasing the number of meals per day has been mentioned in the presented study program, which plays a role in maintaining body mass index. The results of these study agreed with (Alshahrani & Chandramohan, 2017), who explained that the reasons for not maintaining the weight is that the participants depend on eating snacks per day, while eating the main meals is irregular (twice a day). Where a study stated that consumption of unhealthy food has a role in body mass index (Grosso et al,2013). As a study discovered (Viljoen et al., 2018). The participants' BMI was related to food consumption patterns and gender.

The indicative program presented in this study influences improving nutritional and health behavior, as it was found from the participants' physical measures, as a study indicated, (Horta et al., 2012), There are programs that have been updated and developed for the participants with the aim of influencing the eating habits of the participants, which are nutritional education programs, modifying nutritional behavior and providing food.

The educational initiatives and nutritional guidance programs provided, which are designed by nutrition program specialists, have proven to play a major role in increasing knowledge and improving the nutritional behavior of the individual.

Conclusion

This study is providing a new data about knowledge of the nutritional guidance impact on human measurements on female students of the Department of Family Education at Al-Qunfudhah University College - Umm Al-Qura University - Saudi Arabia. The results showed improving physical measurements efficiency of students. These findings may have clear implications for treating nutritional and health problems.



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